

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Framingham, Mass., and additional mailing offices © 1979 by CW Communications/Inc.

No. 50

December 10, 1979

\$1.00 a copy; \$25/year



Training Budgets 'Incredibly Low'

By Don Leavitt

CW Staff

BETHESDA, Md. — Although users spent a bit more for DP training this year, training budgets remained "an incredibly low" 1.4% of the average installation's total DP budget, according to survey results just released by Brandon Systems Institute, Inc. (BSI).

Managers are the most undertrained people in DP "except for operators and keypunch people," a spokesman commented. And application programmers, too, have experienced a significant drop in their training since last year, according to the survey.

The drop in training days received by systems analysts and designers is "alarming" as well, the spokesman continued. People in this particular group had only eight days of training in 1979, compared with 10.7 day/person reported in the earlier study.

(Continued on Page 8)

Second Close Call in a Month

Passenger Jets Nearly Collide Over Texas

By Marguerite Zientara

CW Staff

EULESS, Texas — Two American Airlines jets carrying a total of 230 people came within 600 feet of each other over Texarkana recently after the computer at the Air Route Traffic Control Center (ARTCC) here failed twice within six minutes.

The incident, occurring less than a month after a similar near-miss over North Carolina [CW, Nov. 12], comes at a time when the Federal Aviation Administration (FAA) is under severe criticism for allegedly lax air traffic safety controls.

At 9:14 a.m. on Nov. 27, the Euless ARTCC's main computer — an IBM 9020D CPU, which furnishes alphanumeric data to air traffic controllers' radarscopes indicating each airplane's altitude, ground speed and flight number — went down for four minutes, according to George Burlage, public affairs officer for the Southwest Region of the FAA.

Two minutes passed after the digitized data was restored, and at 9:20 a

Wages Rise an Average 7.5% Salary Hikes Stick to Carter Limit

By Brad Schultz

CW Staff

LAKE BLUFF, Ill. — DP salary increases in the U.S. generally held close to President Carter's antiinflation guidelines through the year ending last June, according to a recently released nationwide survey.

DP salaries rose an average of 7.5% in that period, barely exceeding the Carter Administration's 7% constraint, according to the 15th annual "Weber Survey on Data Processing Positions" from A.S. Hansen, Inc. The Hansen estimate nearly fits the 7.3% average hike in salaries Robert Half, Inc. predicted early this year [CW, Feb. 12].

Late last year, President Carter sent shockwaves through some quarters of the computing community with his announcement that annual salary in-

creases be limited to 7% [CW, Oct. 30, 1978]. At the time, a few categories of DP professionals were accustomed to annual income hikes of twice that rate.

Vendors and user organizations feared losing their most prized employees since the Carter plan did not prohibit an individual from jumping to another firm for much higher pay [CW, Nov. 6, 1978]. Carter called the plan voluntary, but threatened non-compliant firms with loss of federal contracts.

In terms of "families" of DP job slots, Hansen found a 7.12% rise in strictly management stipends. Five job families met the Carter constraint: applications programmers earned 6.33% more than they did last year; workers in DP operations had a 6.26% increase; salaries for computer operations

workers were up 6.23%; telecommunications salaries increased 6.98%; and documentation professionals earned 4.17% more.

Several 'Violators'

But Hansen found other DP job types violating the Carter guidelines — none more so than data base management, with an 11.72% average boost in salaries between mid-1978 and mid-1979.

At 8.33%, data entry workers enjoyed the second fastest growth in income. Salaries in the systems and programming family increased an average of 8.23%.

Other DP job families violating the 7% lid were software programming at 8.18%; DP auditing at 8.03%; data control at 7.36%; and systems analysis (Continued on Page 6)

AT&T Takes New Tack on Image

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — AT&T's front office apparently has decided that the best way of getting the right language incorporated into the new communications act now being drafted in Congress is by relating the present structure of the telephone industry to some pressing national problems, like the energy crisis.

The latest evidence of this strategy is a speech given here late last month by

Ian Ross, president of Bell Telephone Laboratories, at the National Telecommunications Conference, an annual event sponsored by the Institute of Electrical and Electronics Engineers.

Ross began by saying that the national telephone network is evolving into the world's largest computer system. Besides improving existing facilities and services, it will provide some totally new ones — such as intelligent telephones equipped with visual displays that enable a subscriber to decide

whether he wants to accept an incoming call (the display will show the caller's phone number). These phones may also use a distinctive ring to identify priority calls, Ross said.

Lightwave Revolution

On a related front, Ross noted that lightwave communications research has shown that photons can perform "many if not all of the functions" for which electrons are presently employed.

This technological revolution will change the ways many people work, shop, learn, vote and are entertained, Ross added, citing some examples — like an increased ability to work at home — to show these changes will be desirable.

He also reminded his audience that "at a time when there is growing concern about other segments of U.S. industry, the telecommunications business is innovative and profitable. It (Continued on Page 6)

mile of horizontal separation and 600 feet vertical separation.

The planes were both flying from the East into the Dallas-Ft. Worth Airport, one originally traveling at 28,000 feet and the other at 31,000 feet. With the (Continued on Page 4)

GSD Systems Get Price Reductions

By Tom Henkel

CW Staff

ATLANTA — Following the lead of its big brother Data Processing Division, IBM's General Systems Division (GSD) has cut purchase prices for main memory and hardware on four of its systems.

Memory prices were reduced by up to 33% on the Series/1 4955 processor, System/3 models 8, 12 and 15, System/32 and System/34.

CPU purchase prices were cut 15% on the System/3 models 12 and 15, the System/32 and lower end models of the System/34 (those with 8.6M, 13.7M or 27M bytes of storage).

IBM announced similar main memory and CPU price cuts for its larger 30 series of processors, produced by

the Data Processing Division in early November [CW, Nov. 5].

Since IBM did not cut lease and rental fees in either case, the price cuts were probably designed to motivate more users to buy their systems, industry analysts said. This move would bring higher profits for IBM.

More users buying CPUs would also tend to stabilize what has become an unsteady market for IBM, since many users are reluctant to buy systems for fear that faster, cheaper machines will be introduced soon, the analysts explained.

Although GSD profits may increase as a result of its price cuts, the analysts said that wasn't the main reason for the move. Increased purchases from mainly small-

(Continued on Page 8)



Editor E. Drake Lundell Jr.

Managing Editor Nancy French

Senior Editors:
Software Industry Communications Features
Donald Leavitt
Marcia Blumenthal
Brad Schultz
John C. WhitmarshSenior Writer:
Communications Phil HirschCorrespondents:
West Coast Washington, D.C. Jeffry Beeler
Jake KirchnerWriter/Analyst Staff Writers Marcy Rosenberg
Tom Henkel
Timothy J. Scannell
Connie Winkler
Jay Woodruff
Marguerite ZientaraChief Copy Editor Cheryl M. Gelb
Copy Editors Nancy Fleming
Catherine Marenghi
Steve Milmore
Barbara T. VanScoyoc

Photography Editor Ann Dooley

Editorial Assistants Denise Petski
Martha Taylor

Editorial Cartoonist Jim Orton

Contributors:
Education J. Daniel Couger
Taylor Reports Alan Taylor
Human Connection Jack StoneFor Sales, Circulation and Production contacts,
see inside back page.

Please address all correspondence to the appropriate department at 375 Cochituate Road, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1153

OTHER EDITORIAL OFFICES:
West Coast: 407 California Avenue, Suite 10, Palo Alto, California 94306. Phone: (415) 328-8064.

Washington, D.C.: 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

England: Steve Burton, IDG Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: 01-267 1201. Telex: 851 264737.

W. Germany: Eckhard Upadel, CW Publikations, Friedrichstrasse 31, 8000 Munich 40. Phone: (089) 34-90-61. Telex: 515350.

Asia: Hidekuni Sasaki, Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

Australia: John P. Costello, Computerworld Pty. Ltd., 3 Bruce Street, Crows Nest, NSW 2065. Phone: 929-5388. Telex: SECCO AA25468.

Brazil: Eric Hippel, Data News, Computerworld do Brazil, Servicos e Publicacoes Ltda., Rua Alcindo Guanabara, 25/10th floor 20031 Rio de Janeiro, RJ Brazil. Phone: (021) 242-7395 or 263-8046. Telex: 11-32017(WORD BR).

Second-class postage paid at Boston, Mass., and additional mailing offices PNL27420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by CW Communications Inc. Copyright 1979 by CW Communications Inc. All rights reserved. ISSN 127-420. Reproduction of material appearing in Computerworld is forbidden without written permission. Send all requests to Marion Kibbe.

\$1.00 a copy: U.S. - \$25 a year; Canada, Central & So. America - \$35 a year; Europe and Near East - \$75 a year; other foreign - \$125 a year (airmail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35 mm microform through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. Computerworld is indexed: write to Circulation Dept. for subscription information.



POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 375 Cochituate Road, Framingham, MA 01701.

January Workshop to Begin Tackling University Curriculum for Business DP

By Jeffry Beeler

CW West Coast Bureau

POMONA, Calif. — Even though business DPers constitute by far the largest portion of the computer-literate population, most universities still treat business DP merely as an adjunct to computer science rather than as a discipline in its own right. So said Dr. Tom Athey, chairman of California State Polytechnic University's Information Systems Department.

Athey views business DP and computer science as fundamentally different fields and thinks universities should acknowledge that fact by teaching one subject independently of the other. Unfortunately, he said, no one has yet developed any standards for what a good business DP curriculum should entail.

So last year, Athey and some of his colleagues decided to take the educational bull by the horns and began laying the groundwork for what is expected to be the U.S.'s first model business DP curriculum for the 1980s.

Next Jan. 24-25, their curriculum-design efforts will enter a new phase with the start of the Second Annual Business Information Systems Curricula Development Workshop here. Co-sponsored by Cal Poly and the Data Processing Management Association's (DPMA) Education Foundation, the conference is reportedly being held for two reasons:

- To decide what standards undergraduate business DP programs should meet in preparing their students for jobs as systems analysts and programmers.
- To establish the business information systems field as a formal educational discipline, equal in standing to computer science instruction.

Athey and his colleagues envision their two-day workshop as a forum that will give representatives of both industry and the academic world an opportunity to exchange ideas about model curricula and explore questions like:

- What should introductory DP courses cover?
- What systems concepts should be taught?
- How can information systems departments obtain needed educational material?

Model Curriculum

Conference organizers see the upcoming workshop not as the climax of their curriculum development project, but as its starting point, Athey said. After the meeting ends, organizers and participants will review their findings in an attempt to produce a set of concrete proposals.

From these recommendations will ultimately come a finished model curriculum, which is scheduled to make its public debut in 1981 at the National Computer Conference.

Athey and his cohorts decided to undertake the curriculum development project after concluding that most established professional societies like the Association for Computer Machinery (ACM) had failed to adequately address business DP interests and needs.

Like many of his colleagues, the Cal Poly professor divides the computing education field into three sectors: computer engineering, computer science and business information systems.

Computer engineering, he said, concerns itself with the design of computing circuitry and architecture; computer science, with the development of systems software and the optimization

of hardware performance; and business DP, with the preparation of management and user information.

Unfortunately for the other two areas, computer science instruction has traditionally dominated the attention of organizations like the ACM, with their strong technical and theoretical bent. As a result, the business information systems field and its relatively pragmatic issues have often gone largely unnoticed in many of the industry's most influential professional societies.

To alleviate this perceived neglect of business DP instruction, Athey contacted Don Price, president of the DPMA Education Foundation, about the possibility of forming an information systems curriculum that would serve as a standard for all two- and four-year undergraduate programs. Athey sought DPMA's backing for the project, he explained, because he knew the curriculum would stand little chance of becoming a nationwide standard unless it gained the stamp of approval of an established, recognized professional society.

Price and his organization eventually agreed to cooperate with Athey's scheme, and together DPMA and Cal Poly set out to develop a model curriculum that would give business DP education the same legitimacy that computer science had already received from ACM.

More information about the proposed curriculum or the upcoming Business Information Systems Curricula Development Workshop is available from Athey at the Information Systems Department, California State Polytechnic University, Pomona, Calif. 91768.

This Week

IN DEPTH

Maintenance! Follows Page 54

NEWS

FAA Sticks Up for U.S. Air Traffic Control	4
AT&T Found Guilty of Anticompetitive Acts	5
Security Specialist Sees No Way to Stop DP Crime	7
Experts See DP Promise in Soviet Algorithm	9
Congress Pushing Justice Toward Automation	10
USPS, Western Union End Ecom Contract	11
CPU 'Takes Stock' of Gun Barrels	12
Software Woes of '70s Seen Continuing in '80s	13
What Happens to Afips' Revenues from NCC?	14
Fast Action Urged on Transborder Data Flows	15
Two Ways to Reduce Gobbledygook	16
Plato in Eye of Florida Education Controversy	17

EDITORIAL

Editorial: Needless Confusion	18
Cards Better Than Coupons for Gas Rationing	19
Human Connection: Why Programmers Run	19
Taylor Report: Honeywell Should Have Answers	20
Software Putting Programmers Out of Business	22
The Forgotten Factor in Converting to DP	25

SOFTWARE & SERVICES

Labor Grants Funds for Report Systems	29
CICS Users Offered On-Line Development Aid	30
Interactive DBMS Unveiled for PDP-11s	32
Data Dictionary Can Impact Every Department	34

Despite Problems, Pascal Called a Good Choice... 35
RSX-11 Moved to LSI-11..... 36

COMMUNICATIONS

IDCMA Asks FCC to Nix Dataphone II	37
CBX Lightens Utility's Customer Service Load	38
Transmission Converters Introduced	40
Modem Tester Based on MPU	42
Bell-Compatible Modems Feature Integral DAA	43
Harris Asks Private Satellite Net	44

SYSTEMS & PERIPHERALS

Disaster Recovery Centers Springing Up	55
Anatomy of a Failure: Market Wasn't There	57
Student Interest in DP Training Quadruples	60
Apparel Maker Buys CPU, Tucks in \$100,000	62

MINIWORLD

Naval Credit Union Keeps Operations Afloat	63
Micro Built for Small Businesses	66
Transport Switches Tracks Without Operator	67

COMPUTER INDUSTRY

Aussie Roots DP Mission in U.S. Soil	69
Financing for the 1980s: Two Views	69
Office Micrographics to Grow	70
Mini Users Budgeting for '80 Software	74
Acquisitions, Mergers in Services Completed	76
Bradford to Develop Trust System	77
MAI Reports 33% Increase in Revenues	78

PRESIDENT

**Guess who was
just re-elected
“Chief Executive
of Sorting” with
62% of the vote.**

(The Hon. SyncSort OS!)
Call (201) 568-9700.

**Ask for a
copy of IDC's
sort survey.**

Who'll win the biggest prize in American politics next year? Will it be Jimmy, Ted, Gerry, Jerry, Bob or Big Jawn? Or some Dark Horse crouched hopefully in the wings?

Frankly, we haven't the foggiest notion about *that*. But — fearless as ever — we will go out on a limb and make the following astonishing prediction: *None of the above will get as much of the popular vote as SyncSort just received in its election.* (Remember, you read it here first!)

Because this year — for the third time in a row — SyncSort OS won the “Great Sorting Election” by an overwhelming margin. Of the 4,000 OS and OS/VS users in the U.S., a whopping 62% — or 2,480 — chose to sort with SyncSort. (Not bad for a sort program that started out in a log cabin!)

And what about our competitor? Well, it's bad news for the three OS sorts sponsored by the Distinguished Gentleman from the Great State of Armonk. Together they only received 29% of the vote — down from 42% the year before.

The figures quoted are taken from the third annual sort-program survey conducted by the International Data Corporation. Here's what they found out about sort-program distribution in America:

	U.S. Market Share — Percentage		
	July 1, 1977	July 1, 1978	July 1, 1979
SyncSort	43%	54%	62%
IBM	53%	42%	29%
Other	4%	4%	9%

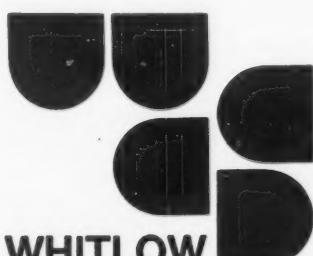
If you'd like a copy of the full report, please let us know. It's available to everyone, including IBM and hopeful politicians.

Why does the voting public prefer SyncSort OS by 2 to 1 over IBM's 5740-SM1, 5734-SM1 and that old “freebie” SM023? Well, we just have to fall back on that political cliche — leadership and performance in office.

Leadership because over the past decade we've come up with almost all the advances made in sorting. As a result, we're increasingly known as “*the sorting house.*” And that hasn't hurt us a bit at the polls.

Then there's performance. If you benchmark SyncSort against any IBM sort, you'll notice a sharp decrease in the amount of computer resources that go into sorting. On average your “*sorting taxes*” will drop 20 to 50%.

And do you know anyone who'll fight for higher taxes?



**WHITLOW
COMPUTER SYSTEMS Inc.** 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Calls System 'Best in World'

FAA Sticks Up for U.S. Air Traffic Control

By Marguerite Zientara

CW Staff

WASHINGTON, D.C. — The country's automated air traffic control system is "the best in the world" in spite of its "inevitable" system failures and interruptions, according to Quentin S.C. Taylor, deputy administrator of the Federal Aviation Administration (FAA).

In a statement prepared as the basis of Taylor's testimony before the House Ways and Means Subcommittee on Oversight two weeks ago, [CW, Dec. 3], Taylor stressed that the FAA is "doing all [it] can to aggressively seek out the causes of system interruptions and to cure them."

The hearings on aviation safety were called after two passenger jets carrying a total of 208 people nearly collided in mid-air over North Carolina Oct. 31 after a computer failure at the Leesburg, Va., Air Route Traffic Control Center (ARTCC) [CW, Nov. 12]. The day after the hearings took place, a similar near-miss occurred over Texarkana, Texas (see story on Page 1).

While the FAA recognizes that system outages will occur, it maintains "a high level of controller skill and training . . . to safely deal with the difficulties associated with the transition from

one mode of air traffic [control] to another," Taylor claimed.

In discussing the history of automated air traffic control, Taylor emphasized the sophistication of today's narrowband radar system with digitized alphanumeric data as opposed to the pilot-controller voice communication-based system in use until the end of World War II.

While acknowledging that transitions between automated and broadband systems entail mental as well as physical adjustments on the part of controllers, Taylor argued "it is clear that transitioning from RDP [radar data processing] to broadband radar is far preferable to the situation just five years ago when system failures in broadband required a transition to manual control as the only backup system."

Start-Overs vs. Outages

Taylor distinguished between "unscheduled start-overs" — system interruptions of less than one minute — and "outages" — interruptions lasting one minute or longer and possibly resulting in the complete loss of narrowband radar data.

Unscheduled start-overs can occur when a system element malfunctions

and is automatically replaced with a standby unit, Taylor explained. The information on the radarscope does not disappear when a start-over occurs; rather, the last known aircraft data are simply not updated.

"In this way, the effect on the controller is minimized," he said, noting that digitized radar information is normally updated only once every 10-12 seconds.

Start-Overs Reduced

Furthermore, he said, as a result of the FAA's continuing technical efforts, "we have reduced the number of start-overs from 15-20 per week just two years ago to the present level of about seven per week per center."

Unscheduled start-overs are caused primarily by hardware failures and software "problems," which the system is programmed to detect in order to prevent the presentation of erroneous data to a controller, Taylor explained.

"Consequently, when the system detects erroneous data which could mislead the controller, it either corrects that data with no interruptions or flushes that data from the system by inducing a start-over," he said.

Therefore, start-overs are in them-

selves "beneficial," he contended, since "it is readily apparent that providing erroneous data to the controller could have disastrous effects."

Interruptions of more than one minute are "of more concern," however, Taylor claimed, because most result in the total loss of alphanumeric data to controllers and therefore less efficient controlling of air traffic.

At the Leesburg, Va., facility, outages have occurred at the rate of about one each week, he said, with an average duration of approximately seven minutes.

Safety Concerns

"Recently, there have been blanket charges made that system interruptions pose a hazard to aviation safety," Taylor noted. "While it is understandable that interruptions might raise concerns about safety, the reality is that the system itself, as well as air traffic procedures, is designed to accommodate interruptions without creating safety problems."

"I would like to reemphasize that it is not possible to completely eliminate system interruptions in any computer system — particularly one which is as complex and sophisticated as ours," Taylor claimed.

Conceding that is not "a desirable situation," and that any shift in operations can increase the possibility of a system error, Taylor went on to describe the FAA's plan for improving the existing situation.

Taylor described the FAA's ongoing training program for air traffic controllers, which includes simulated system failures and the resulting transitions between broadband and narrowband radar.

Since 1977, the FAA has refined its reporting system for interruptions to provide "a better management tool to address the problem," Taylor said. System software is now tested five times instead of one and at two locations instead of one.

The agency has "tried to improve [its] response time" to system problems, has provided "new and more advanced test equipment" and has improved lightning protection at centers to reduce the possibility of power failures, Taylor explained.

Planned Measures

The new Direct Access Radar Channel (Darc) automated system will serve as the future backup to RDP, providing limited data blocks, altitude readout, weather, maps and an improved display over broadband. And in the mid-1980s, the FAA hopes to install an Electronic Tabular Display System (Etabs) to replace the present flight strip printers with electronic displays and touch-entry devices, Taylor said.

But before the end of 1982, the FAA hopes to implement an Automated Data Distribution System to provide an electronic data transmission system for transmitting computer tapes to field facilities.

And in the mid- to late 1980s, "we are planning to replace our entire existing network of air traffic control computers at a cost on the order of \$1.5 billion . . . which may well be the biggest computer project ever undertaken," Taylor said.

Two Jets Nearly Collide After DP Failures

(Continued from Page 1)

data blocks still showing, the aircraft at 31,000 feet asked for clearance to descend to 24,000 feet and got the "go ahead," Burlage said.

Moments later, the plane traveling at 28,000 feet also asked to descend "for smoother weather" and also got the go ahead, Burlage said. Very soon after that, the controller saw the two planes converging, indicated by the data blocks on his radarscope, and took evasive action.

With the incident still under investi-

gation, there are two theories circulating on the cause of the near-miss, Burlage said. Some speculate that a mechanical malfunction may have caused the disappearance of one or more data blocks on the radarscope while others were still displayed.

Others theorize that, while working with broadband nondigitized radar only — which does not indicate altitudes — the controller simply may have forgotten that he had given the first plane clearance to descend. According to this theory, it was only after

the restoration of digitized data that the controller was aware of the potentially disastrous situation.

Examination of the recorded voice tapes of the controllers is expected to indicate whether the controller who gave the second jet permission to descend was working with the digitized altitude information.

Reported Downtime

While Burlage claimed the center is "relatively free from computer downtime," with average failures of four minutes' duration once a week, he noted there have been failures of up to 17 minutes at times. Two days before the near-miss, a power fluctuation caused the system to go down for an hour and 20 minutes, he added.

When asked whether the two outages were related, Burlage said investigators "are trying to relate them." Although the exact cause of the 20-second interruption on Nov. 27 is not known, the initial four-minute outage has been attributed to a malfunction in the storage element of the computer display channel — an IBM 9020E that does radar processing and tracking functions that are then digitized by the 9020D, Burlage explained.

Possible causes of the 20-second malfunction include the computer's rejection of "wrong data" — data in the wrong format — or a bad memory card.

Correction

Additional comments on the data base question discussed in the Nov. 26 In Depth article on "IBM Data Base Surprises?" are contained in the November 1979 issue of "Data Base Newsletter," which is available from Performance Development Corp. — not Professional Development Corp. — at Building P, 1101 State Road, Princeton, N.J. 08540.

Value Computing Inc.

Software Systems
For More Efficient
Data Centers

**Run ISAM files
on 3330-11
and 3350
with
DOS/VS Rel. 34**

**With the Value Computing
Advanced Function ISAM 3330-11
3350 Native Mode Support—**

- No reassembly of your programs
- No changes to your JCL
- Completely transparent to Operations

Please send me more
information about
ISAM Native Mode
Support

Value Computing Inc.
300 VCI Building, W. Marlton Pike
Cherry Hill, NJ 08002 • NJ (609) 429-4200
Toll-Free (800) 257-8242

Name

Title

Company

Phone

Address

State

Zip

City

Operating System

Judge's Remarks Cause Delay Of MCI vs. Bell

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — The trial of MCI Communications Corp.'s massive antitrust suit against the Bell System was put off for two months last week to offset possibly prejudicial remarks by the judge, John F. Grady.

In a pretrial order, Grady said MCI's witness list "seems to contemplate an efficient presentation of the evidence," but AT&T's much longer list "persuades me that [the] defendants' approach to the case is grandiose."

After these comments were published by the *Chicago Sun-Times*, Grady decided they might be an "impediment to the selection of an impartial jury." He ordered the process deferred until Feb. 4, apparently hoping the story and his remarks will be forgotten by then.

MCI has accused AT&T and its operating companies of monopolizing the point-to-point, private-line "business and data communications services market" in violation of the Sherman Act by refusing to interconnect some Bell facilities with those of MCI and imposing arbitrary restrictions in other cases.

It also accused Bell of engaging in a variety of anticompetitive marketing practices. For example, "under the guise of an independent survey," AT&T allegedly has asked prospective and already signed-up MCI customers whether they would accept lower priced services from the telephone company and then described new, "competitive" services to be offered by Bell in the near future.

AT&T also stands accused of using a "quantity discount pricing structure ... which makes it economically impractical for a customer to divide his total business and data communications" between Bell and MCI.

Other charges made by MCI: the phone company has announced new data and voice services far in advance of the time they became available, at rates significantly below those charged by MCI for similar offerings; Bell has prolonged federal and state regulatory proceedings to keep MCI out of new markets; and Bell has engaged in a "massive public propaganda campaign ... falsely and continuously" asserting that "the interconnection sought by MCI would result in technical harm to the national telephone network and ... economic damage to the Bell System and its public subscribers."

Bell Countersuit

Bell responded to these charges by filing a countersuit which accuses MCI of engaging in many of the same practices. The first, and major, count of the complaint is directed at MCI Communications Corp., the holding company for several operating subsidiaries (for example, MCI-New York West, Inc., which operates between Chicago and New York City; MCI Telecommunications Corp., serving Toledo-Detroit, Dallas and several intermediate cities; and Interdata Communications, Inc., serving New York, Baltimore, Philadelphia and Washington).

MCI's holding company is accused of milking the subsidiaries by forcing (Continued on Page 6)

CW Washington Bureau

WASHINGTON, D.C. — AT&T and two subsidiaries were found guilty late last month of violating the Sherman Antitrust Act in a case involving many of the same practices over which MCI Communications Corp. has sued AT&T.

The decision also may provide the Department of Justice with additional ammunition in its pending suit to break up the Bell System.

On Nov. 21, a federal district court jury in Bridgeport, Conn., decided un-

animously that AT&T, Southern New England Telephone Co. and Western Electric Co. were guilty of all the anti-competitive acts charged by Northeastern Telephone Co., a key telephone and PBX supplier.

Charges Against Bell

Northeastern had charged that Bell priced terminals below cost to discourage competition; charged discriminatory rates for service to customers who used Northeastern terminals; ran ads designed to cast doubt on the quality

and reliability of independently manufactured terminal equipment; and announced products long before they became available to prevent customers from considering similar competing products.

Furthermore, Bell was charged with over-designing the protective coupler interface required prior to June 18 for linking independently made interconnect terminals to the dial-up networks in order to increase the cost of the coupler and make interconnect equipment more expensive for the end user.

**LOOK, DOS/VS
and DOS/VSE USERS!**
... it's a Space/Manager
... it's a Tape/Manager
... it's a File/Manager
... it's a Job/Manager
... it's a System/Reporter
... it's

**SYSTEM
MANAGER**

At last, DOS/VS and DOS/VSE users can solve resource management problems in a single bound!

With SYSTEM/MANAGER on your side, you'll have the power to manage a wide variety of resources. You'll have the ability to see through the maze of utilization options. You'll be able to shrink hardware costs while helping programmer productivity soar!

Get SYSTEM/MANAGER — the super-friend from Altergo!

- SPACE/MANAGER provides automatic disk space allocation/deallocation, eliminates ASSGN and EXTENT cards, saves space, and simplifies 4300-series and VSE upgrades by providing VSE compatible JCL.
- TAPE/MANAGER shares an integrated catalogue with SPACE/MANAGER, providing centralized tape-based data set control essential when using tape files. Ideal for concurrent high usage of fixed-head disks and frequent backup/reload requirements.
- SYSTEM/REPORTER gives customized, user selected reports on resource utilization, component bottlenecks, file data, and much more.
- FILE/MANAGER permits program-transparent file usage from any tape or disk, offering full file security with audit trails to track file usage.
- JOB/MANAGER provides OS-like job stream management capabilities without the need for costly conversions and associated overly-complex JCL requirements. Powerful but simple-to-use JCL preprocessing facilities and conditional JCL capabilities are featured.

We need powerful help to combat rising hardware costs and plummeting programmer productivity. Send me details on System/Manager today.

And also tell me more about Altergo's SHADOW II GUTS QUOTA II

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ System _____



The Distinctive Name
for Quality Software

altergo
4 Faneuil Hall
Boston, MA 02109 • (617) 227-5100

Rises in DPers' Pay Close to Carter's 7% Limit

(Continued from Page 1)
at 7.10%, the survey found.

"The fact that employers were able to hold to a 7.5% increase in this period of dramatic inflation is commendable and certainly close enough to the President's guidelines," according to Philip G. Henderson, a Hansen vice-president.

Most DP professionals received promotions in the past year, Henderson said. Hence, many DPers garnered a 10% to 12% salary increase without violating the Carter plan, which only pertains to salary raises within a given job category, he explained.

The salary for an organization's top DP executive rose 10.1% to an average of \$41,700, the survey found. The highest paid person reported in that position earned about \$100,000 annually in direct compensation.

Hansen obtained salary data from 1,510 DP installations reporting on 117,895 employees. Among the users Hansen investigated were AT&T, the Coca-Cola Co., six Federal Reserve banks, McGraw-Hill, Inc., the San Diego city schools and *The Dallas Morning News*.

Several cities exceeded the 7.5% nationwide average increase, the survey noted. In Denver, DPers earned 15% more; salaries were up an average of 12.2%, 11.8% and 8.3% in Minneapolis, Milwaukee and Dallas, respectively.

In contrast, large northeastern cities such as Boston and New York generally experienced less salary movement, Henderson said.

National Averages

The Hansen survey listed the following salaries as national averages for specific DP positions: assistant manager of corporate DP, \$34,200; manager of DP administration and planning, \$31,500; regional or division DP manager, \$33,600.

A Few Definitions

A.S. Hansen, Inc.'s "Weber Survey on Data Processing Positions" uses a number of DP job names that may overlap, appear redundant or simply not jibe with some peoples' perspectives.

Hansen drew the following distinctions:

- A *corporate DP manager* is an organization's top DP executive. Under him may be several *divisional* or *regional* DP managers.
- A *manager of systems analysis and programming* directs the various grades of *systems analysts/programmers*. The *lead analyst/programmer* has some supervisory duties, whereas the *senior analyst/programmer* is allowed to work on his own most of the time.

• *Applications programming* is directed at solution of business, scientific or engineering problems. *Software programming* involves development of utility programs, job control languages, macros, subroutines and other software that may be transparent to the end user.

• By *DP operations*, Hansen means literally the processing of information at various levels of automation. *Computer operations* refers to support of computer hardware and software. Hence, the computer operations manager may report to the DP operations manager.

Other national averages: manager of systems analysis and programming, \$30,300; lead systems analyst/programmer, \$25,300; senior systems analyst/programmer, \$22,300; systems analysis manager, \$29,700; lead systems analyst, \$25,600; and senior systems analyst, \$23,400.

The nationwide average salary for an applications programming manager

was \$26,700, Hansen stated. National averages for lead and senior applications programmer, manager of software programming/analysis and lead software programmer/analyst were \$23,200, \$19,600, \$30,000 and \$26,300, respectively.

DP operations managers responsible for programming activities earned \$31,800 nationwide on the average,

but DP operations managers without such authority earned \$27,300.

The burgeoning data base management area sported a \$28,500 average for managers and a \$24,900 average for senior data base analyst/programmers.

The Bonus Situation

However, bonuses in addition to salary yielded a significant portion of many high-level DPers' total income, Hansen pointed out. Where bonuses were given, corporate DP directors received an average bonus worth 17.5% of their salaries; divisional or regional DP managers received 14.6% of their salaries as bonuses; and managers of systems analysis and programming got an extra 12.6% of their salaries in this way.

Some observers of the DP income situation view bonuses and "perks" as a ruse to sidestep the Carter clamp on soaring salaries.

On the other hand, the President's Council on Wage and Price Stability has given users a more direct means of avoiding the 7% lid. The council exempts from the 7% lid job categories for which employers can document labor shortages. DP professionals are considered to be in short supply.

AT&T Taking New Tack on Image

(Continued from Page 1)

does not harm people, nor does it harm the environment. . . . It has . . . been estimated that for each dollar of added GNP [Gross National Product], the telecommunications industry uses one-tenth of the energy used on the national average.

"Clearly, there are opportunities to displace . . . high-energy functions, such as travel. . . . Our productivity [in the telecommunications industry] has improved at three times the national average."

'Sensitive' Areas

To keep the technological revolution from slowing down or getting sidetracked, however, Ross listed some "areas in which I believe we must be particularly sensitive."

One of his concerns, apparently, is that the government will spend too much on applied research and not enough on basic research: "We have an obligation to devote adequate resources to the search for basic knowledge — to provide the information to support the needs of users 10 and 20 years from now. [While] basic research and development is strong in tele-

munications today . . . there is concern about the emphasis in other industries on low-risk, short-term needs at the expense of long-term needs. We must be alert to assure that this does not happen in our technology-based industry."

Ross' other major concern is the "forthcoming new balance between completion and regulation." Pointing out that "the manufacturing of telecommunications equipment has always been a competitive arena" while "provision of certain services has been regulated," he observed that "the balance between competition and regulation has supported a steady flow of innovation in the telecommunications business."

Informed Legislators

One logical inference from all this is that changing the balance will reduce the innovative flow. A little later, Ross said "there are technical issues involved and we have a responsibility to ensure that the legislators are properly informed on these issues."

He then illustrated what can happen

if Congress tries to decide "technical issues" on its own. In 1897, he explained, the Indiana legislature passed a bill that would have changed the value of pi from 3.1416 to 9.2376.

"Had this bill become law, it would have had a profound effect on the quality of life in the state of Indiana," Ross pointed out. "Fortunately, a professor of mathematics who happened to be visiting the state house on an entirely different matter ran across this bill. He talked to the Senators — I suppose you would say he lobbied — and . . . the bill was tabled by the Senate."

The technical issues before the Congress today "are not as profound as changing the value of pi," Ross added, "but they certainly are more complex. We, the telecommunications engineers, have a responsibility to inform Congress on these technical issues to be sure that the decisions they make will serve us well in the future. . . .

"Of course, we do not want the engineering profession to interfere in politics, but also we do not want politics impeding the beneficial application of telecommunications," he said.

MCI vs. AT&T Postponed

(Continued from Page 5)

them to accept "unwanted or unnecessary services" and of forcing subsidiary stockholders, by use of its "dominant financial position," to give up their managerial control.

Bell also charged MCI Communications Corp. with filing its antitrust suit "further to hinder [the Bell System's] ability to compete in the relevant market and as a part of [MCI's] attempt to monopolize that market."

Bell and MCI are each seeking treble damages for their alleged injuries, plus court orders barring various practices.

Both suits are being tried by the U.S. district court in Chicago. MCI plans to

put 17 witnesses on the stand, while AT&T will use at least 183.

MCI has filed a second antitrust suit, in the Washington, D.C., federal district court, against Bell, the U.S. Independent Telephone Association and the major independent telephone companies. This one which won't come to trial for several months, accuses the defendants of monopolizing the market for switched and nonswitched intercity telecommunications services and of distributing the "resulting illegal profits" through the settlements process.

In its Washington suit, MCI is asking for \$1 billion in damages.

1-DAY SHIPMENT

NEW TABLE TOP LA34 DECwriter \$1225

CALL (617) 261-2700

AMERICAN COMPUTER GROUP

PO BOX 68 BOSTON MASS 02215



We Have to Share Our Computer With the Office Upstairs.

But Criminals Can Still Be Caught

Security Expert Sees No Way to Stop DP Crime

By Tim Scannell

CW Staff

BOSTON — While security passwords, codes and data encryption devices may strike fear in the hearts of novice DP criminals, there is virtually no way a company can stop an experienced thief from accessing and stealing a system's data.

However, if the company knows what information was taken and at what time the theft occurred, it can almost always track down the computer culprit, according to Dennis Huaman, an internal security specialist with the General Electric Co.

Speaking here last week at the International Conference of Wang Users, sponsored by Wang Laboratories, Inc., Huaman addressed the problem of computer system security and detailed a number of ways managers could darn obvious holes in their security blankets. Although hundreds of people were at the annual meeting, only about seven showed up for the security session.

Three Types of Crooks

Huaman identified three basic types of DP crooks, each of whom inflicts a particular form of damage on the computer system. The first — and the most dangerous — is the user who is determined to "get back" at the company or steal certain pieces of information from the computer system.

Usually knowledgeable, members of this class of thieves will probably stop the CPU's internal clock before entering the system and restart it after the data is taken. He might also pull the plug on the computer's software-based audit trail or even erase a portion of the disk containing the system's usage log, Huaman said.

The second type of criminal is the programmer or systems analyst who has authorization to access the system, but "gets curious and starts browsing" through the system's data base and finds all sorts of things ranging from personnel records to proprietary corporate files.

Then, finally, there is the operator or lower rung DP worker who may or may not have authorization but uses the computer as a private electronic playground, running rounds of tick-tack-toe and wasting valuable system time by processing interoffice bowling scores.

Most Vulnerable Time

Although stealing data directly from a computer without anyone knowing it is probably the most widely publicized and romantic type of DP crime, most of a company's data is actually taken when it is transmitted to other sites or transferred to hard copy, Huaman said. Information is at its weakest security level when it leaves the bosom of the processor.

Alluding to last year's multimillion dollar theft from California's Security Pacific National Bank [CW, Nov. 13, 1978], Huaman claimed that most communications systems are vulnerable because they rely on passwords or a series of codes for security. When these codes are broken, information can be filtered off gradually and its absence not discovered until days or weeks after the actual crime.

Adding to the problem is the ambiguity of the value of computer data, especially from a legal standpoint, Huaman

said. Since a company can't easily assign a dollar value to its corporate data, it can measure its worth only by how

much it would cost to replace and how much of an edge a competitor gains by
(Continued on Page 8)

A Hint of James Bond

By a CW Staff Writer

BOSTON — Like dog owners who sometimes seem to resemble their pets, conference rooms occasionally seem to fit a speaker's topic.

One of the sessions at last week's International Conference of Wang Users, for instance, focused on computer security. While it required a bit of imagination, the room in which the session was held offered more than a

hint of James Bond.

A little bigger than a large closet, the room seemed to be totally sound and air-proof when both doors were closed. Its main entrance was guarded by a surly-looking individual who sat by a telephone throughout the lecture, and the door to his right sported a one-way peep hole that was perfect for spotting unwanted visitors.

The speaker, Dennis Huaman of

General Electric Co., ended his lecture 15 minutes early because of an overactive heating system and invited audience members to ask questions and draw upon his private and governmental security experience. No one took him up on his offer.

Huaman then picked up his briefcase and walked out the door, followed by his mysterious companion. Just like they do in the movies.

Are you in control of your IMS system?

Before you say yes, ask yourself these questions:

Do you know at all times the level of service you're providing?

To maintain consistent levels of service, managers must know current and required response time. MANAGE:IMS, a new information system from Capex, keeps you posted daily and monthly on response times for every transaction and every application. It indicates peak periods and service variations throughout the day. By organizing this information, MANAGE:IMS enables you to focus quickly on response time problems.

Can you easily identify performance bottlenecks?

Changes in performance and resource utilization become obvious as MANAGE:IMS evaluates system, application and transaction activity against benchmark data. Exception reporting pinpoints performance bottlenecks.

The result is better control and faster resolution of IMS problems.

Do you have response time and availability reporting?

MANAGE:IMS reports on response times for every transaction and application, and it identifies IMS availability problems. MANAGE:IMS displays the amount of IMS system and message region availability achieved. Exception reports and graphs highlight down time and performance problems by the hour, day, or month.

Do you have automatic forecasting and trending?

You do with MANAGE:IMS. It maintains historical data, measures it against current information and automatically produces six month projections. You get the information and gain the understanding needed to plan effectively for the future.

Do you have control over your entire IMS environment?

If you demand ever increasing control over your IMS facilities, on maintaining your standard of user service, on improving IMS system availability, and at the same time on developing greater long-range planning capabilities, you need MANAGE:IMS. It installs immediately, with no modification to IMS or the operating system. Call or write today for more information.

Capex Corporation
P.O. Box 13529, Phoenix, AZ 85002
Tell me more about MANAGE:IMS.

Name _____
Title _____ Company _____
Address _____ City _____
State _____ Zip _____ Phone _____



ED

Helping business do business better.

Atlanta (404) 451-8415 • Boston (617) 329-6170 • Chicago (312) 986-8618 • Houston (713) 460-8555 • Los Angeles (213) 862-5102 • New York (201) 472-7000 • European Headquarters: Amsterdam (020) 46-15-56 • Other offices in Dusseldorf, Paris, London

Training Claims Only 1.4% of Average Budget

(Continued from Page 1)

The application programmers plummeted, on average, from 14.2 days of training reported in 1978 to 9.6 days this year. BSI said this drop could be attributed to two factors: first, most moderate-sized organizations believe they have already trained their staff members in structured design and programming, so programmer training is reduced. Second, many organizations have a severe shortage of good programmers, and managers are refusing to let those people go to training.

More than 200 organizations responded to BSI's questionnaires when they went out in August and September, a sharp increase from the 98 organizations that answered the 1978 survey conducted some 18 months earlier.

This year's round of questions was comprehensive enough to require two to six hours on the part of each respondent. It was divided into three basic sections: looking at the respondents, their organizations and their jobs; looking at budgets and spending patterns; and looking at the training vendors the respondents use.

BSI's interest in the results is natural enough. The company offers a spectrum of instructor-led classroom-oriented courses in the DP area.

DP Training Directors

When BSI asked respondents for their position or title, more than half reported they are formally DP training directors. Other titles cited showed there is a strong interest on the part of top management in the issues addressed in the survey.

BSI also commented that it expects to see human resource development and training specialist positions rising within the DP ranks as their activities are recognized as significant to improving productivity and cutting high turnover rates.

With an average of 288 people in the DP organizations reporting, the DP training director's salary averaged

\$25,075 but ranged from \$8,800 to \$45,000. Pay raises for them did not keep pace with inflation, BSI noted.

The survey team also noted that the lack of management training — managers got only 6.4 days of training this year — may account for the criticism of DP management as lacking professionalism compared with their counterparts in other departments within their companies or organizations.

At the other end of the professional scale, BSI found that 85% of the respondents reported they provide entry-level training for people coming into the DP organizations.

The BSI spokesman commented that respondents were typically large organizations, and the budget figures seemed to bear that out. The average total DP budget (with 130 organiza-

tions reporting) was \$12,285,769. The average DP training budget for the same group of respondents was \$172,290.

The old feeling that when money gets tight, the DP training is the first to go just doesn't hold true anymore. Sixty-five percent said if downward changes are needed, training is cut in proportion with the rest of the budget, but 70% added that they, in fact, anticipated growth in their upcoming budgets.

When asked about what vendors they use, 71% said they use on-site training supplied by outside firms, but this was a 10% drop from 1978.

When asked in what subject areas they were having difficulty finding quality outside vendor training, more than half said they had no problem finding instruction in any subject.

Specific problem areas reported by the rest were scattered among IMS, systems analysis, "top management," operator training, data communications and systems programming, but none of these received more than nine "votes" as trouble spot.

When the surveyors asked to which multimedia-training vendor the training directors would turn in each of nine categories, Advanced Systems, Inc. got the nod in five, while Deltak, Inc. was the leader in the other four.

When the question was focused on "standard" training vendors, BSI ranked on top in two cases; Yourdon, Inc. led another; but IBM "took" six of the categories.

Copies of the 20-page survey results are available from BSI at 4720 Montgomery Lane, Bethesda, Md. 20014.

GSD Cuts Memory, Hardware Prices

(Continued from Page 1)

time users probably won't net IBM mammoth profits — unlike the price cuts on the 30 series, which may result in handsome profits from top-of-the-line 3033 users who find it cheaper to buy multiple 3033s while waiting for IBM's long rumored H series of supposedly cheaper and more powerful CPUs.

Instead, the analysts theorized, GSD has another announcement up its sleeve. Since it would almost be impossible for GSD to show any kind of fourth-quarter profits resulting from the price cuts — because of their late announcement — analysts feel the decrease presages a first-quarter 1980 announcement of either a high-end addition to the 4300 line or a mid-sized CPU that will offer more power than the System/34 but less power than the troubled System/38, which IBM has had trouble getting off the ground because of problems with 64K memory chips.

IBM watcher Robert Fertig, president

of the Technical Analysis Group at Advanced Computer Techniques Corp. in New York, agreed the GSD price cuts are a forerunner to either a System/35 or System/36 announcement.

Further delays in System/38 shipments will be the prime motivation behind a mid-sized system announcement. Fertig thinks the System/38, which has already been delayed six to nine months, will be delayed another three months.

In order to protect its user base and provide a mid-sized machine to System/3 and System/32 users that can't wait for the System/38, IBM will

be forced to make the announcement in mid-winter, according to Fertig.

However, he ruled out the possibility of an imminent announcement of a high-end addition to the 4300 series. That announcement will come in early spring, he said.

Fertig also disagreed with other IBM watchers who said the GSD price cuts will not have a dramatic effect on IBM's profits. Fertig expects IBM to do very well as a result of the price cuts.

IBM declined comment on the price decreases, saying only that "the price reductions are a result of a normal business review."

No Way Seen to Halt Thefts

(Continued from Page 7)
having the data.

Huaman stressed that companies can thwart computer criminals by centralizing operations as much as possible, encrypting transmitted data, using

codes and passwords and limiting computer and terminal access as much as possible.

On the subject of hard-copy and computer printouts, Huaman stated that he has learned more about a company and its internal structure by sifting through its garbage than he could if he tapped its computer files directly. Contract proposals, program listings, internal memos and even interoffice love letters casually tossed on the rubbish heap have not only spelled out what's going on within a company, but where that company is headed and with whom it is doing business, Huaman observed.

All documents should routinely be destroyed or at least screened before they leave the confines of the corporate walls, he said.

Finally, the security specialist cautioned his audience to consider the responsibilities and potential dangers of taking on government contracts or working with federal agencies. If an individual petitions the government for certain information under the Freedom of Information Act or similar legislation, then the company could become involved and be forced to bare its corporate soul.

What's even worse is that the firm might have to supply a detailed record to the person stating when a file was created, how many people inquired about the file and if and when the file was corrected, Huaman said. Most companies don't get that involved with their audit trails, he noted.



Terminals NOW!

3 Month Lease or Immediate Sale

Your single source for brand-name terminals.

Used Equipment Corner



Execuport®
Portable

only \$495.

Features reliable NCR printer

Call:

East: (617) 246-1665

P.O. Box 185, Lynnfield, MA 01940

West: (415) 461-0923

700 Larkspur Landing Cir., Larkspur, CA 94939

QWIKTERM

Solves Linear Programming Problems

Experts See DP Promise in Soviet Algorithm

By Jeffry Beeler

CW West Coast Bureau

PALO ALTO, Calif. — Investigators have only begun to explore the implications of a recent Soviet mathematical breakthrough, but some experts are already "optimistic" the discovery will find widespread DP application, according to computing expert Dr. Ronald Graham.

The breakthrough by Russian mathematician L. G. Khachian is still so new and original that no one is sure yet exactly how users will ultimately benefit from the discovery, said Graham, who heads Bell Laboratories' Discrete Mathematics Department at Murray Hill, N.J.

For the moment at least, the development is mainly of interest only to theoreticians and computer scientists, but attempts to unearth its potential applications will probably begin to bear fruit sometime during the next year or so, Graham said recently at Stanford University, where he is serving this academic quarter as a visiting professor of computer science.

In a telephone interview here, the Bell Labs researcher described Khachian's discovery as possibly equal in significance to the invention of lasers. When lasers first burst on the scene a number of years ago, they aroused tremendous scientific curiosity, but the full extent of their usefulness was not appreciated until much later.

Today, Khachian's breakthrough is likewise in its infancy, and many — though certainly not all — experts suspect it will eventually prove as broadly useful in computing as lasers have been in so many other fields, Graham explained.

Problem-Solving Shortcut

In essence, the Soviet discovery provides a mathematical shortcut for solving linear programming problems, which rank among the most important in all of computing. Some linear programming problems involve thousands of variables manipulated in millions of combinations and are so complex they require years to solve, even with computers.

In the past, most efforts to tackle linear programming problems have relied on a mathematical procedure known as the "simplex algorithm." Developed by Stanford computer scientist Dr. George Dantzig, the simplex method represents computational problems as many-sided, multidimensional figures in which each vertex corresponds to a possible solution.

Under the method, a computer examines the vertices one at a time and then picks the one point that represents the best combination of all the variables.

For the overwhelming majority of linear programming problems, the simplex method has long served as the favorite method of solution, and its preeminence is unlikely to be seriously challenged by the advent of the Khachian algorithm, Graham predicted.

Even so, computer scientists long ago realized they could contrive "pathological" problems for which the simplex procedure was found to be totally inadequate, he said. These problems entailed such an unimaginably immense number of calculations that they proved all but theoretically im-

possible to solve.

The Khachian algorithm, by contrast, circumvents this "exponential blow-up" of computational steps by providing computer scientists with a "very different way of looking at and approaching" linear programming problems, Graham explained. Instead of visualizing problems as complex polyhedra (as the simplex method does), the Khachian algorithm uses N-dimensional ellipsoids in its representations.

The technique surrounds the solution to a linear programming problem with successively smaller ellipsoids until it finally isolates the answer. In this way, the algorithm "allows you to examine

large chunks of a problem at one time and lets you zoom in on the solution" in considerably fewer steps than the simplex method requires, Graham said.

Contrary to some recent reports, the Soviet algorithm has yet to find any known applications for either weather prediction or cryptography, Graham said.

On the other hand, he continued, the method does show some promise as a possible means of solving "combinatorial optimization" problems, the object of which is to determine the value of a large number of restricted variables in the best possible way. An example of such a problem would be airline per-

sonnel scheduling, in which thousands of employees must be assigned job slots and working hours with a minimum amount of waste.

Khachian's method might also be used someday to yield approximate solutions to very difficult problems for which no exact answers are thought to be possible, Graham said. For example, if the New York City telephone company tried to chart the shortest possible route to take in collecting money from its thousands of public pay phones, the new Soviet method could probably come within 10% or so of the right answer — not absolute perfection, to be sure, but close enough for most practical applications.

(Advertisement)

(Advertisement)

Now you can teach yourself COBOL the way professionals use it

The trouble with most books and courses is that they're unrealistic. They may teach you how to write simple card-to-printer programs, but they don't teach you what a professional programmer needs to know. They don't teach COBOL the way it's used in industry. They don't teach the most current methods of program design. And they don't teach the operating system concepts and JCL that are critical to the effective use of COBOL.

Now, however, I'm happy to announce a COBOL book that teaches you how to use COBOL in the way that the best programmers in industry use it. The book is so effective that most people will be able to learn structured COBOL from it without any outside assistance. In fact, as you will see later, we guarantee it.

3 reasons why this book is effective

1. This book was written under the technical supervision of Paul Noll. Paul has been a software specialist and training manager for Pacific Telephone; he's been the manager of the COBOL group in GUIDE, an association of large IBM users; and he now consults in businesses throughout the nation. Paul has taken pains to see that the COBOL in this book is not only accurate, but that it also represents the practices that are currently in use in the best COBOL shops in America.

2. The educational approach used in this book has been adapted from a book called *Standard COBOL* by Mike Murach. This book has been used by more than 200 colleges and universities for classroom instruction, by dozens of businesses for inhouse training, and by thousands of professionals for self-instruction. As a result, the method of instruction has been proven effective many times over.

3. Because we feel it's impossible to teach a student how to code structured programs without also teaching him how to design structured programs, this book gives extensive coverage to modern design techniques. In my opinion, this material is essential to learning structured COBOL, even though you won't find it in most competing books and courses.

What this book does

In brief, a student who completes this book will have the skills of an entry-level programmer in industry. In terms of COBOL, the book teaches a professional subset that includes JCL and COBOL for sequential files on tape or disk.

Because two sets of COBOL standards are currently in use (1968 and 1974), this

book teaches a subset of the two that will run on either a 1968 or 1974 compiler. By using this subset, you won't have to modify the programs you write in 1968 COBOL when your shop converts to 1974 COBOL. If you are already using 1974 COBOL, this book prepares you for maintaining 1968 programs, converting 1968 programs to 1974 COBOL, and developing new programs in 1974 COBOL.

Since the emphasis of this book is on standard COBOL, you will find it useful no matter what system you're using. However, this book is specifically designed for users of DOS or OS on the System/360-370. In particular, it presents a programmer's subset of DOS and OS JCL along with the important IBM extensions to standard COBOL.

Related products for the experienced COBOL programmer

This book is part 1 of a two-part course in structured COBOL. Part 2: *An Advanced Course* is for COBOL programmers who want to increase their knowledge so they can make full use of the COBOL language. These books, however, fill only one of the training requirements for COBOL programmers.

The other requirement is to teach experienced COBOL programmers to use the new productivity techniques. For this purpose, Paul Noll developed a book called *Structured Programming for the COBOL Programmer*. This book is currently used by hundreds of companies for

programmer training. And it can make programming more enjoyable at the same time that it increases productivity.

As a reference manual for the development of new programs, Paul developed *The Structured Programming Cookbook*. It presents standards and guidelines for a structured COBOL shop that have been adopted by hundreds of companies throughout the country. And it presents complete solutions for four business programs. By using these model solutions as guides for new program development, a programmer doesn't have to start each program from scratch. In this way, the Cookbook can have a major effect on programmer productivity.

Our unlimited guarantee

So there's no risk to you, all our books are sold with an ironclad guarantee. If you or your programmers can't learn to develop structured COBOL programs using the books alone, you can return them for a full refund, no matter how long you've had them. In addition, you can take up to 30 days to review the books without paying anything.

So order *Structured ANS COBOL* today. And if you haven't seen Paul's structured programming text and cookbook for experienced COBOL programmers, by all means order a set of these books too. As one customer wrote: "Paul's books are the first ones I've seen that are really useful to the COBOL programmer who wants to write structured code."

Mike Murach & Associates, Inc.,
4222 West Alamos, Suite 101, Fresno, California 93711

SC1-1R

Dear Mike: Please send me the books indicated below. I will take up to 30 days to review them. After that, I will take advantage of your unlimited guarantee. If the books don't prove to be effective, I will return them for a full refund...no questions asked. I understand I will be billed the appropriate price plus freight (plus sales tax in California).

Quantity	Book	Price	SEND CASH AND SAVE:
_____	Structured ANS COBOL (part 1)	\$17.50	If you send cash with your order, we'll pay the freight. That's a savings of about \$1 per book.
_____	Structured ANS COBOL (part 2)	\$17.50	If you live in California, be sure to add 6% sales tax to your order total. (Offer valid in the United States and Canada.)
_____	Structured Programming for the COBOL Programmer	\$15.00	
_____	The Structured Programming Cookbook	\$15.00	

Name and Title _____
 Company (if any) _____
 Address _____
 City, State, Zip _____

Congress Pushing Justice Toward Automation

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — After years of frustrated hairpulling over inadequate Justice Department management information systems, Congress is now vigorously prodding the department to develop useful automated recordkeeping practices.

For almost 10 years, the department has been trying — for the most part unsuccessfully — to develop comprehensive litigation information systems to better account for the time and money spent by its Criminal, Civil Rights, Antitrust, Land and Natural Resources and Tax Divisions.

But even with the little systems work already under way, "the information systems implemented or under devel-

opment vary in format and level of detail. Thus, uniform data on litigation activities will not result," Congress' General Accounting Office (GAO) reported recently.

An Old Story

To the House Government Information and Individual Rights Subcommittee, which requested the GAO study, the story is an old one.

"The shortcomings have been known for years," Subcommittee Chairman Rep. Richardson Preyer (D-N.C.) told the House last month. In 1973, Justice abandoned a three-year effort to develop a system that would provide detailed data from the U.S. Attorney's Office on cases pending, he noted.

"Under a Justice Information Man-

agement Systems, there was supposed to be data on the cases' change of status and sentencing. But the system was halted in 1973 because dates were not being entered and the computer was not working right.

"In 1974," Preyer continued, "a new Automated Case Load and Collection System was launched to, among other things, keep track of cases referred to U.S. attorneys and determine how complex they were. However, in July 1978 an internal audit report determined that a feasibility study of the system had never been done, nor had objectives been established.

"Also, the system had technical and performance problems. The GAO estimated that more than \$2 million had been spent on the system, but now, be-

cause of the problems, there are no plans to establish it nationwide," Preyer said.

Congress Hampered

The House subcommittee is pulling its hair because the Justice automation problems have hampered Congress in its oversight and budget functions. As the GAO pointed out, uniform data collected into a usable data base "would no doubt alleviate some of the past problems Justice has encountered in supplying budget and cost data supporting resources requests."

Furthermore, lack of data has thwarted congressional attempts to determine how much fraud has been committed against the government, Preyer said.

In another example, "the Senate Committee on the Judiciary tried to find out how many outstanding judgments or fines the Justice Department could collect, and the department's estimates ranged vaguely between \$500 million and \$1 billion," he said.

That \$500 million equivocation and similar experiences in trying to wrest information from the department have prompted the Preyer subcommittee to undertake a detailed study of how Justice procures and uses information technology and services [CW, Nov. 19].

Residual Resistance

The GAO reported that some of the delays in implementing acceptable litigation management information systems stem from earlier attempts that involved cumbersome and unsuccessful reporting techniques, leaving a "residual resistance" to the automated systems on the part of Justice Department attorneys.

For the last two years, however, top management backing for the systems has increased, and as recently as last February then-Attorney General Griffin Bell directed the "immediate formation" of a management system task force.

But, as Preyer noted, "so far it has launched no offensive. Today, despite the outlay of \$1 million, the efforts of the various litigation divisions may be several years away from completion."

But the future isn't entirely bleak. "In the meantime, most of the divisions are at last establishing systems of timekeeping — even though they differ — which will be somewhat useful for budgeting," Preyer said. "Also, most of the divisions have automated or plan to automate case files, which will allow for more ready retrieval of data on individual cases."

In addition, Preyer's subcommittee and the Senate Judiciary Committee have called for the department to submit by Jan. 1 a plan to consolidate information systems.

The GAO is also cautiously optimistic about the prospects for Justice Department automation. "While much remains to be done, Justice is now making an effort toward improving the availability of information on litigation activities," the recent report concluded.

"At present, it is too early to assess the success of these efforts, but considering the past situation, the steps being taken are a move in the right direction."

	OVERALL SATISFACTION	EFFICIENCY/EASE OF USE	EASE OF INSTALLATION	DOCUMENTATION/VENDOR TECH SUPPORT	TRAINING
FAST DUMP RESTORE	3.7	3.7	3.6	3.2	2.9

REORGANIZE DISK VOLUMES

COMPACTOR eliminates free space fragmentation by placing data sets contiguous on a disk volume. Multi-Extent files are merged into one extent. By using an FDR backup tape, COMPACTOR reorganizes in place.

DATA SET PLACEMENT

Data sets may be positioned on a pack to user specifications. Using simple control cards a user can configure a disk to reduce head movement.

ALTER VTOC SIZE AND LOCATION

Entries within the VTOC are also compacted reducing data set search time.

FAST DUMP RESTORE

FDR with over 3000 users and nominated to the DATAPRO HONOR ROLL for the 5th consecutive year, has a proven record of RELIABILITY and EFFICIENCY. FDR permits the user more opportunity to backup his files while using significantly less CPU and elapsed time.

FREE 30 DAY TRIAL

COMPACTOR is licensed by CPU for IBM 360/370 computers running OS, VS or MVS Operating System. COMPACTOR supports 2314, 3330, 3340 and 3350 type disks. COMPACTOR is available as an option to FDR.

For Further Information
or Free 30 Day Trial, Call or Write...

 INNOVATION
DATA PROCESSING

970 Clifton Avenue, Clifton, NJ 07013 • 201-777-1940

But Controversy Not Over USPS, Western Union Cancel Ecom Contract

By Phil Hirsch

CW Washington Bureau
WASHINGTON, D.C. — The U.S. Postal Service (USPS) and Western Union Telegraph Co. last week canceled their 15-month-old agreement to offer Electronic Computer-Originated Mail (Ecom) service. The Postal Service said it would solicit communications facilities for a similar service from all carriers interested in providing them.

The announcement represents a major victory for Graphnet Systems, Inc. and other vendors of competing electronic message services (EMS). They have charged that the Western Union-USPS contract was a sweetheart deal designed to give the telegraph company a competitive edge in the rapidly growing EMS market and protect the Postal Service against an independent Ecom-type offering by Western Union.

But the Ecom controversy may not be over.

Postmaster General William Bolger, in announcing termination of the Western Union contract last week, said the Postal Service still intends to retain control over its future Ecom service offering. To retain this control, USPS would have to resell to the end user the communications facility it leased from carriers.

However, the Federal Communications Commission (FCC) has already ruled the USPS can't offer Ecom without getting the FCC's prior approval to operate as a common carrier [CW, Aug. 6]. USPS has asked the U.S. Court of Appeals to review the FCC ruling, and at the moment everyone is waiting for a decision.

Bolger indicated that invitations to bid on the communications facilities needed to support Ecom will go to prospective suppliers within the next several weeks. He reported that the new service, when launched, will be a commercial rather than a test offering.

The Postmaster General emphasized in his statement that he doesn't see the Western Union contract termination as

a defeat.

"We entered into this agreement with Western Union because we determined, after conversations with many companies, that Western Union was the only one at that time that could provide the services required." However, the agreement included a provision, "after 15 months, that would allow us to get competi-

tive bids from all other communications companies that might wish to provide transmissions and data processing services for Ecom."

The failure of the initial arrangement with the telegraph company, Bolger added, was due to "factors beyond our control" — specifically, the drawn-out proceeding at the Postal Rate Commission and

the position taken by the FCC.

However, a little later in his statement, Bolger said: "I must also be candid and say that . . . we too have become more knowledgeable about the problems and opportunities of entering into telecommunications."

"We have learned a lot . . . Certain changes in the way we now envision . . . Ecom should

meet our customer's needs better."

One such change, apparently, is that the upcoming Ecom service will "be compatible with, and accept input from, the broadest possible number and types of industry-provided computer, word processing, facsimile and related EDP devices now and in the future."

The Microcomputers you should take seriously.

The Challenger III Series is the microcomputer family with the hardware features, high level software and application programs that serious users in business and industry demand from a computer system, no matter what its size.

Since its introduction in August, 1977, the Challenger III has become one of the most successful microcomputer systems in small business, educational and industrial development applications. Tens of thousands of Challenger III's have been delivered and today hundreds of demonstrator units are set up at systems dealers around the country.

The Challenger III systems offer features which make their performance comparable with today's most powerful mini-based systems. Some of these features are:

Three processors today, more tomorrow.

The Challenger III Series is the only computer system with the three most popular processors — the 6502A, 6800 and Z-80. This allows you to take maximum advantage of the Ohio Scientific software library and programs offered by independent suppliers and publishers. And all Challenger III's have provisions for the next generation of 16 bit micros via their 16 bit data BUS, 20 address bits, and unused processor select codes. This means you'll be able to plug a CPU expander card with two or more 16 bit micros right into your existing Challenger III computer.

Systems Software for three processors.

Five DOS options including development, end user, and virtual data file single user systems, real time, time share, and networkable multi-user systems.

The three most popular computer languages including three types of BASIC plus FORTRAN and COBOL with more

languages available from independent suppliers. And, of course, complete assembler, editor, debugger and run time packages for each of the system's microprocessors.

Applications Software for Small Business Users.

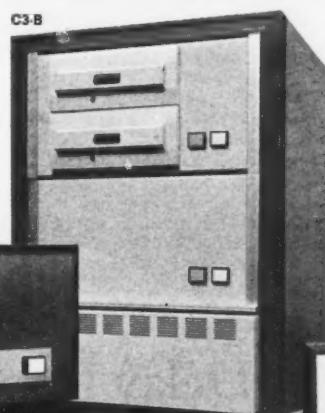
Ready made factory supported small business software including Accounts Receivable, Payables, Cash Receipts, Disbursements, General Ledger, Balance Sheet, P & L Statements, Payroll, Personnel Files, Inventory and Order Entry as stand alone packages or integrated systems. A complete word processor system with full editing and output formatting including justification, proportional spacing and hyphenation.

OS-DMS, the software star.

Ohio Scientific offers an Information Management system which provides end user intelligence far beyond what you would expect from even the most powerful mini-systems. Basically, it

The Challenger III Series from Ohio Scientific.

C3-B



C3-S1



allows end users to store any collection of information under a Data Base Manager and then instantly obtain information, lists, reports, statistical analysis and even answers to conventional "English" questions pertinent to information in the Data Base. OS-DMS allows many applications to be computerized without any programming!

The "GT" option yields sub-microsecond microcomputing.

Ohio Scientific offers the 6502C microprocessor with 150 nanosecond main memory as the GT option on all Challenger III Series products. The system performs an average of 1.5 million instructions per second executing typical end user applications software (and that's a mix of 8, 16 and 24 bit instructions!).

Mini-system Expansion Ability.

Challenger III systems offer the greatest expansion capability in the microcomputer industry, including a full line of over 40 expansion accessories.

Networking and Distributed Processing

OS-65U level 3 now provides networking capabilities as well as time sharing ability allowing Challenger III based systems to be expanded to meet the most demanding business applications.

Prices you have to take seriously.

The Challenger III systems have phenomenal performance-to-cost ratios. The C3-S1 with 48K static RAM, dual 8" floppies, RS-232 port, BASIC and DOS has a suggested retail price of under \$4000. 80 megabyte disk based systems start at under \$13,000. Our OS-CP/M software package with BASIC, FORTRAN and COBOL is only \$600, and other options are comparably priced.

For literature and the name of your local dealer, CALL 1-800-321-6850 TOLL FREE.

C3-B wins Award of Merit at WESCON '78 as the outstanding microcomputer application for Small Business.

OHIO SCIENTIFIC
1333 SOUTH CHILlicothe ROAD
AURORA, OH 44202 • (216) 562-3101

C3-OEM

Calendar

Jan. 28-31, Los Angeles — Cryptography and Data Security. Contact: Hellman Associates, 730 Alvarado Court, Stanford, Calif. 94305.

Jan. 30-Feb. 1, Washington, D.C. — The Computer Language: Basic. Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Who says you can't get an LA-120 or LA-36?

Call DDI now and get off-shelf delivery.

(While our supply lasts!)

NEW YORK CITY	CHICAGO
(212) 687-2030	(312) 858-3770
MORRIS PLAINS, NJ	ATLANTA
(201) 267-2311	(404) 433-2023
PHILADELPHIA	ST. LOUIS
(609) 662-2833	(314) 432-6121
WASHINGTON, DC	DALLAS
(202) 488-0773	(214) 387-2222
CINCINNATI	HOUSTON
(513) 769-0680	(713) 961-4711
Detroit	LOS ANGELES
(313) 358-2600	(213) 990-9200
SAN FRANCISCO	
(415) 349-7262	

Right now, we are able to fill orders immediately from our warehouse stocks. That's because DDI, as one of the nation's largest suppliers, is a volume buyer of key products like DEC LA-36 and LA-120. With shortages and allocations developing in the marketplace, other suppliers are running out. At present depletion rates, our supply should last until Dec. 31—but there's no guarantee of that. So call our nearest office now—and beat the shortage!

Data Dimensions, Inc.
99 River Road, Cos Cob, CT 06807
Tel: (203) 622-0500

Programs Machines to Carve Patterns CPU 'Takes Stock' of Gun Barrels

Special to CW

WESTWOOD, Mass. — Some things change, yet remain the same.

Closely spaced grooves and patterns are still carved into the stocks of rifles and guns, but at least one weapons manufacturer is now using computers rather than a craftsman to duplicate these intricate designs.

Checkering, as these patterns are called, has always been both a safety feature and an index of a firearm's quality, according to Robert F. Thomas of A.S. Thomas, Inc., a machine tooling company here. The firm uses a Digital Equipment Corp. PDP-11/34 minicomputer to produce magnetic control tapes for Connecticut-based arms maker Winchester-Western.

Programmed with a mostly numerical fixed-format language known as Nuform, the tapes control the actions of a series of multisindle, multiaxis cutting machines that carve diamond-shaped patterns into the wooden surfaces of the rifles at the rate of one weapon every four minutes.

Process Begins

Checkering-tape programming begins when Winchester-Western sends a stock with a handcrafted design and several blanks to the Westwood tooling firm. These stock models and any custom rifles are created by highly skilled artists who work two to 15 hours on each gun's design, Thomas said.

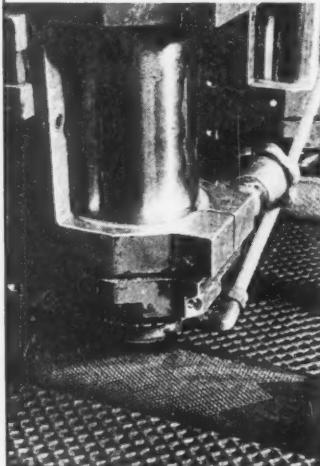
Since each gun stock is an artistic surface that is difficult to define mathematically, A.S. Thomas engineers must first measure the cross-section of the stock blanks at selected intervals in order to create a computer model. The basic design and model are then programmed with the Nuform language and analyzed on a DEC VT-11 graphics display.

The Nuform language is used because it contains no action words, commas, slashes, parentheses or other alphanumeric figures, Thomas explained. Programmers enter stock and pattern data into fixed fields with numeric notations, keeping the input as brief as possible.

Other peripherals that aid in the creation of the carving tapes are eight disk drives with total on-line storage capacity of 20M bytes; a DEC LA36 printer; a VT-100 CRT terminal; a California Computer Products, Inc. Model 563 X-Y plotter; and a high-speed paper tape reader/punch.

A DEC PDP-11/20 with 32K bytes of

Clockwise from top:
A highly skilled craftsman devises intricate checkering patterns on shotgun and rifle stocks, a job that can take two to 15 hours. These designs are converted into programs and put on magnetic tapes which drive high-speed machines that can checker six stocks simultaneously in four to eight minutes. Final photo is a closeup of a router in action.



memory serves as a satellite processor for the graphics display, removing this burden from the 224K-byte central processor, Thomas stated.

The checkered patterns are initially displayed on the DEC graphics terminal in two dimensions to verify correct input. The pattern then is superimposed on the mathematical model of the stock to obtain a three-dimensional picture to ensure there are no interferences.

To generate the control tapes, the Nuform program and the PDP-11/34 automatically convert coordinates and travel orders into the instructions for the machine tool.

The minicomputer calculates a tool-path plot describing the tool's motion and a tool-point plot defining the cutting head's position.

"The tool must be positioned at the correct angle, otherwise the wood may splinter, lines will not be parallel or the pattern will smear," Thomas said.

Programs are again viewed on the graphics terminal and then plotted in three dimensions.

When all the lines look even and the resolution is correct, the tape is created.

The tape, plot, listings and drawings are then sent to Winchester-Western where they are used on four- or six-spindle milling machines that cut up to six blanks simultaneously.

Of course, there are simpler ways to slice a rifle. For instance, the designs could be reproduced by pressing a heated mold against the blank wood. But the resulting patterns would not be as crisp as hand- or computer-produced checkering and have an unsafe, slippery feel, Thomas observed.

Feds Delay Implementation Of Contested I/O Standards

WASHINGTON, D.C. — The federal government has postponed implementation of four controversial I/O interface standards, which have been the basis of suits brought against the government by four major computer manufacturers.

The standards go into effect June 23, 1980. Three of the standards had originally been scheduled for implementation Dec. 13, while the fourth had been slated for June 23 enactment.

Control Data Corp., Honeywell, Inc.,

No Productivity Breakthroughs Software Woes of '70s Seen Continuing in '80s

By Jake Kirchner

CW Washington Bureau

ARLINGTON, Va. — Software development in the 1980s will be plagued with the same problems as in the 1970s unless there are some dramatic breakthroughs in managing the end-to-end process — an unlikely prospect at best, according to Rand Corp.'s Dr. Willis Ware.

"In the end-to-end software scene I guess I can't see any big productivity improvements" over the next few years, Ware said recently at the "Computers in the 1980s" conference here. "We're going to live the '70s all over again, and in 10 years we will be saying the same things."

"I'm not gloomy about the '80s," Ware continued, just "cautiously optimistic" that the DP industry will learn to manage software development just a little bit better.

New programming languages, software sharing, structured programming, better programming environments and more programmer access to computers will be beneficial, but the industry will still face consistent manpower shortages and the myriad problems of managing software life-cycle support, Ware said.

Incremental Improvements'

There will probably be only "incremental improvements" in software development, according to Ware, who proceeded to draw an analogy between hardware and software advances.

"We all know perfectly well the pace of [hardware] technology." The price of unit logic decreases consistently and dramatically "but the black boxes don't get any smaller" and the overall system costs remain about the same, he noted.

The reason, he conjectured, is that we keep stuffing more and more applications into those boxes as it becomes economical to do so.

The same is true for software, he continued. As soon as we learn something new we make it standard, continually pushing forward the state of the art. "We are doing things as fast as we can figure out how to do it" and as fast as the manpower becomes available.

"As long as that prevails," he said, "we aren't going to get any better," and the dollars and time required for software development will remain fairly constant.

Manpower Problem

Manpower will continue to be a major problem, he said. "The university curriculum is simply not turning out the kinds of people we need" — people who after a year or so of apprenticeship can pull their own weight.

In the past, the industry has benefited from a secondary source of manpower trained in science and mathematics who have had some programming training and have augmented the programmer ranks, and that might continue, he said.

One additional source of manpower in the future may be the millions who are entering the computing field through hobby computers, Ware suggested, although he expressed no great optimism over this possibility.

An underlying problem, he stressed, is that more personnel and better pro-

gramming techniques address only a small part of the end-to-end cycle of software development.

The actual programming is only the middle stage of a process that includes "a heavy front end" of intellectual work that must be done before programs can be written and a "back end" that includes debugging and testing.

Management must also consider the life-cycle support — maintenance, documentation and "all those things you do to software after it is finished and delivered."

"It's not an art form. We shouldn't look at it as one and we shouldn't manage it as one," he said.

And we shouldn't look to new higher

order languages (HOL) as a cure for all the ills of software development, Ware continued.

"Without a doubt, there will be new [HOLs] invented," but their impact will be modest. A 25-year investment in the existing languages, their documentation and programmer training ensures that the new languages will be ignored "unless they earn their way."

Unless some ingenious method of translating old languages into new is invented, the new HOLs will only be used for new applications.

Life-Cycle Support

Another mark of the next decade will be that the issue of life-cycle support

"is really going to get into focus," he said. Management complains about the resources that life-cycle support consumes, but it is "the price we pay for change and improvement if we want change and improvement."

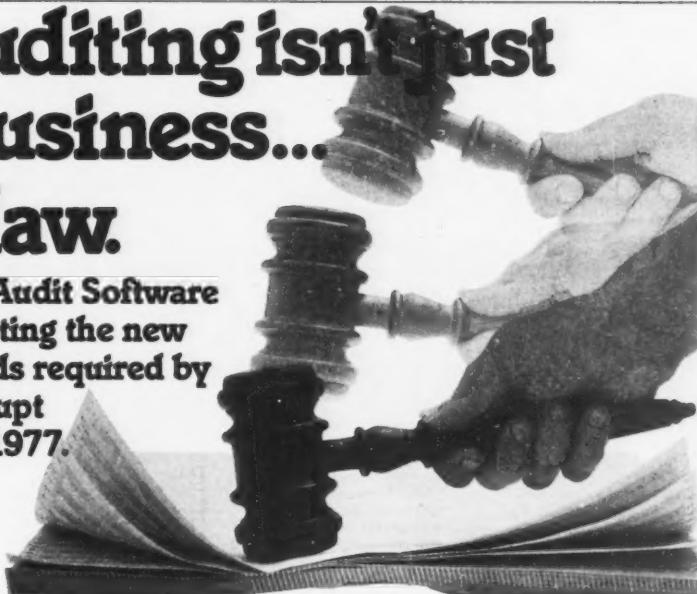
"We will belatedly realize we should design with life-cycle support in mind," he predicted. Management will learn how to manage it and the necessity to budget for it.

"While we have learned some things in software development, such as the value of top-down design and structured programming, we obviously have a lot more to learn and will have to learn or the life-cycle support will eat us alive," Ware said.

EDP Auditing isn't just good business... It's the law.

Learn how EDP Audit Software can assist in meeting the new auditing standards required by the Foreign Corrupt Practices Act of 1977.

Attend a free seminar in your area.



The accounting standard provisions of the Act require the establishment and maintenance of a system of internal accounting control sufficient to provide "reasonable assurance" that the objectives of internal control specified by the AICPA are met.

Cullinane offers a complete family of audit software to help the EDP auditor meet these requirements.

Because the designers were auditors themselves, all Cullinane audit software is extremely easy to use, flexible and gives immediate results. It is efficient in its low requirements for manpower and computer resources.

Cullinane's EDP Audit Software enables both internal and external auditors to audit any computer, yet you don't need to

be a programmer to use it. We give you a library of 50 commonly used audit routines. You can use them as is, or change them, extend them, to fit your needs exactly. As an example, you get routines for File Familiarization, File Footing and Control, Exception Analysis, Summary Analysis, Confirmation of Accounts, Selection and Statistical Sampling.

The audit package you choose depends upon your hardware. EDP-AUDITOR runs on IBM or compatible systems. CARS operates on IBM, non-IBM or mixed systems, as well as mini's EDP-AUDITOR/3 runs on IBM System/3s. Sign up for the free seminar most convenient to you.



Dates and Cities

January

8 Dayton, OH
8 Portland, OR
8 St. Louis, MO
10 Dallas, TX*
15 Atlanta, GA*
15 Cleveland, OH
15 Phoenix, AZ
16 Chicago, IL*
16 Hartford, CT
16 New York, NY*
17 Nashville, TN
17 Omaha, NB
17 Toronto, ONT*
22 Detroit, MI*
22 Houston, TX*
22 Los Angeles, CA*
22 Philadelphia, PA*
22 Providence, RI
22 San Jose, CA
24 Louisville, KY
30 Montreal, QUE

February

5 Kansas City, MO
5 Tampa, FL
6 Las Vegas, NV
6 Washington, DC*
6 Westbrook, NY
7 Birmingham, AL
7 Indianapolis, IN
7 Minneapolis, MN
12 Little Rock, AR
12 San Diego, CA
13 Milwaukee, WI
13 Ottawa, ONT
14 Buffalo, NY
14 Denver, CO
14 Tulsa, OK
20 Bridgeport, CT
20 Springfield, IL
21 Newport Beach, CA
21 Topeka, KS
26 Miami, FL*
27 Des Moines, IO

March

4 Tucson, AZ
6 Albuquerque, NM
6 Columbus, OH
6 Seattle, WA
11 Jackson, MS
11 Saddlebrook, NJ
12 Memphis, TN
12 Richmond, VA
18 Charlotte, NC
18 Quebec City, QUE
19 Baltimore, MD
19 Riverside, CA
20 Boston, MA*
25 Calgary, AB
25 New Orleans, LA
25 Pittsburgh, PA
26 Syracuse, NY
27 San Francisco, CA*
27 Vancouver, BC

*Denotes cities in which Regional User Group Meetings will be held.
Afternoon sessions open to users only.

I want to attend your EDP-AUDIT seminar in:

City _____ on _____ Date _____

My computer is _____

Name/Title _____

Name/Title _____

Organization _____

Address _____

City _____ State _____ Zip _____

Phone _____

Mail to: Rosalie Cope
Cullinane Corporation
20 William Street
Wellesley, Mass. 02181
Phone (617) 237-6600

CW 12/10/79

Audit Software: Cullinane

What Happens to Afips' Revenues from NCC?

ARLINGTON, Va. — Thousands of Dpers migrate every spring to the computer industry's "Big Event" — the National Computer Conference (NCC) — where packed technical sessions and jammed exhibit floors have sometimes spilled over into extra hotel space (NCC '79) or even into parking garages (NCC '78).

Although each year's NCC is months in the making, the show passes quickly and only the memories and the money remain. So what happens to the profits the huge exposition reaps for its sponsor, the

American Federation of Information Processing Societies, Inc. (Afips)?

The answer is that, although NCC is a huge extravaganza, most of the profits are spent on the show itself or are put back into the computer societies, Afips said.

An examination of Afips' 1979 revenues shows that total revenues from conferences — of which NCC is by far the most substantial money-maker — amounted to \$2,790,000, while conference expenses and obligations amounted to \$2,204,000, according to

Afips.

Besides the usual expenses of labor, rent and publicity, NCC expenses also include a charter financial obligation to the four principal member societies of Afips: the Association for Computing Machinery (ACM); the Data Processing Management Association (DPMA); the Institute of Elec-

trical and Electronics Engineers (IEEE) and the Society for Computer Simulation (SCS). ACM, DPMA and IEEE each receive 15% of NCC profits, while SCS receives 5% and Afips itself receives 50%.

In 1979, Afips' total revenues from conferences, the Afips press, member dues and other income amounted to

\$2,981,000. Its total expenses for the year amounted to \$2,856,000, which went toward conferences, publications, the History of Computing project, international activity, the Washington office center, public information, administration and projects and committees. The balance was put into a reserve fund.

Documentation And Surveys

- WORD PROCESSING
- DP MANUALS
- USER MANUALS

INFORMATION SPECIALISTS, INC.
438 East Shore Trail
Sparta, N.J. 07871
Phone: (201) 729-4915

**Discover why
hundreds of PDP-11 users
have turned to us
for Pascal.**



program structure, uncluttered syntax, and other advantages of full standard Pascal.

But there's more, in the form of real-time extensions, 15 digit (double precision) arithmetic, in-line assembly code, I/O hardware access, FORTRAN interface, Direct-access files, Overlays. Plus others. There's even an interactive symbolic debugger.

Reliability? Introduced in 1975, we're at over 400 sites now. We guarantee stated performance and provide 1 year of follow-up support. Give us a call; we have a demo library, manuals, and benchmark, ready for your inspection.

Distributors:
Australia: Sydney; Network Computer Services, 290 3677
Canada: Vancouver; Valley Software, (604) 524-9741
England: Stafford; Hounds Computing Ltd, 0785 44221
Japan: Tokyo; Ritsei Corporation, 03-345-1411
TWX 910-464-4779

They're in process control. In data base management. In education, research and communications. Running on LSI-11's, PDP-11/70's and everything in between. RSTS/E, RT11, RSX or IAS — it makes no difference, they praise our Pascal.

Because they all have one thing in common. A desire to get more from their PDP-11 than another language — or another Pascal — can provide.

We've captured the elegance of Pascal in a real world compiler. It converses directly in machine language, giving remarkable execution speed and efficient memory use. It features straight-forward

**Oregon
minicomputer
Software
inc.**

2340 SW Canyon Road
Portland, Oregon 97201
(503) 226-7760
TWX 910-464-4779

PDP-11, LSI-11, PDP-11/70, RSTS/E, RT11, RSX, and IAS are trademarks of Digital Equipment Corporation

Dive Unit Gauges Decompression

By Jay Woodruff

CW Staff

NORTHFIELD, Ill. — An inexpensive microprocessor-based system that provides divers with instant numeric readouts on all important dive parameters has been developed by Dacor Corp.

The Electronic Dive Computer weighs two pounds and is about two-thirds the size of a carton of cigarettes. Designed to be worn on the wrist, the unit operates at depths of up to 250 feet and is reportedly sensitive to changes of as little as one foot.

Power comes from a six-volt rechargeable battery. The dive computer replaces an underwater watch, a bottom timer, a depth meter and a water pressure gauge — items that usually cost more than the \$435 that Dacor charges for its compact system, a spokesman indicated.

Decompression Guide

In addition to information on depth and time spent on dive, the unit provides the diver with a guide to decompression — rising slowly enough to avoid the "bends," a painful affliction where a too-rapid ascent from a deep dive causes nitrogen gas bubbles to form in the bloodstream.

The 10-function system is permanently programmed with decompression tables drawn up by the U.S. Navy. Any time a diver exceeds an ascent rate of 60 feet a minute, a light-emitting diode (LED) warning comes on.

Additional functions include an LED that lights when the diver must decompress (and

remains on until decompression is complete) and a display that shows the maximum depth attained in a dive and at what depths the diver must stop to go through decompression, Dacor said.

To operate the Electronic Dive Computer, the diver merely turns the device on and begins the dive. A pressure transducer on one end of the unit measures the increasing pressure as the diver descends, converts it from an analog to a digital signal and stores it for calculations used to guide the diver through the necessary steps of ascent.

All calculations are performed automatically, and essential information is displayed on single-bulb LEDs. If more information is needed, a

numeric display can be turned on to show time already spent on the dive, depth, time needed to decompress and at what level the diver must remain until decompression is complete, according to the system's designer William Bowden.

The product of six years of software and hardware development, the Electronic Dive Computer has been held up in production because of difficulties in making the custom-designed chips, Bowden said.

The chip maker so far has only been able to obtain a chip yield of 5 chips instead of the hoped-for 175.

Dacor has given the producer until January to iron out its problems before switching to another source.

UNIX*

**Sublicenses Leasing Development
Support Time-Sharing DBMS**

RLG Associates, Inc. (703) 471-6860

1760 Reston Ave. Ste. 508
Reston, VA 22090

*UNIX is a trademark of Bell Laboratories

CENTRONICS
102A
9 X 7 DOT MATRIX

330 CPS SPEED

**THE MOST WIDELY USED
OEM PRINTER AVAILABLE TODAY!**

ONLY \$1390

**— Bidirectional Printing
— Dual Print Head
— 132 Print Columns**

ALSO IN STOCK: 101, 101A, 103, 501, 530, 761KSR

CALL (617) 261-1100

**AMERICAN
USED COMPUTER**
P.O. BOX 68, KENMORE STA., BOSTON, MA. 02215

**NOW...
All the
benefits of
Carpeting
with better
STATIC
PROTECTION
than tile.**

COMPU-CARPET™

High Performance Anti-Static Carpeting

COMPU-CARPET permanently anti-static carpets and COMPU-MAT™ • Eliminate static problems in computer and terminal areas • Protect sensitive electronic equipment • Meet IBM recommendations • Provide comfort and acoustical advantages of high quality carpeting • Carry a 5-Year wear and static warranty.

U.S. Pat. No. 4,153,749.

Dept. CW
32 Southwest Industrial Park
Westwood, MA 02090
(617) 326-7611

UTP
**UNITED
TECHNICAL
PRODUCTS, INC.**
THE STATIC CONTROL PEOPLE

Don't Wait for Embassy Takeover

Fast Action Urged on Transborder Data Flows

By Connie Winkler

CW Staff

NEW YORK — Don't wait for someone to take over an embassy — address what is threatening the free flow of information now.

That was the advice of James D. Robinson, chairman of the American Express Co., at a recent session on transborder data flows here sponsored by the U.S. Council of the International Chamber of Commerce.

Threats to free data flow across national borders can be anything from a licensing requirement on data bases or a tax on satellite transmissions.

"It's not simply an American problem," Robinson said. "Restriction of the flow of data processing [industry] data affects all industries — therefore, you have allies all over the world."

'Call to Arms'

He urged corporations here to point out the impact of data flow restrictions to companies abroad. Those companies will have more influence on their own country's laws and governments, he said.

The session, with about 150 attendees, turned out to be a call to arms — to both corporations and the U.S. government — to organize action groups to ensure free information flow.

Not all the participants, however, were convinced of the dangers to transborder transactions. One suggested the issue was still being discussed on a philosophic level and that it wouldn't have any impact until presented in economic terms.

Two Approaches

Speaker Harry B. DeMaio, IBM's director of data security programs, described the two approaches to the data flow problem. The European model says knowledge is power, and if any one sector has a monopoly on that knowledge, it is necessary to protect the individual against it.

By example, DeMaio told of problems Readers' Digest encountered trying to get a subscribers data base in Sweden. The Swedish government, which has a data protection law, objected that the list provided too large a demographic picture of Swedish life.

Data protection comes through licensing or registration of data bases or through data transmission tariffs, based either on quantity or class of information transmitted.

The American approach centers around privacy and the post-Watergate control of government in-

tervention into the lives of citizens, DeMaio explained.

To reconcile the two approaches, he suggested a more positive selling of the benefits to keeping an open flow of information across borders. This has to start at the company level, the IBMer said.

"Multinationals should translate their position to the countries where they operate, not just in the U.S.," DeMaio said.

Just Beginning

"This fight is just beginning," according to Stanley M. Swinton, vice-president and director of world services for the Associated Press. "As

these doors come slamming down, you will find it harder and harder to find out what is going on around the world and to your representatives."

Swinton called attention to proposals coming from the United Nations and the United Nations Educational, Scientific and Cultural Organization (Unesco). He also suggested that the rhetoric to date on transborder data flows has been "the junk food of this whole debate."

What is happening with the transfer of data is what has happened with foreign governments' treatment of journalists, particularly Americans, he said.

John M. Eger, Washington, D.C.,

lawyer and former head of the White House Office of Telecommunications Policy, also urged quick action.

"In the rest of the world, they know that information is power and economic information is economic power," Eger said. Americans, however, have spent too much time talking about the problem of information flow and have lost sight of its importance to the world economy, Eger said.

Eger told of a Brazilian official who was taking copious notes at an international session on privacy legislation. When asked why, the official replied that he knew of no better scheme to regulate multinational company activity.



Take off with Software AG!

With our easy-to-use DB/DC, the sky's the limit.

Adabas: Designed for the future.

Your information needs are constantly changing and growing. But with Adabas, you don't have to reorganize your data base.

Here's another surprise. When you install Adabas, your data base will be up and running in just a few days.

An integrated data dictionary controls the data base, and you'll get instant inquiry and report generation.

Com-plete: The power you'll need tomorrow.

With one software product, you can manage all on-line activities. All.

And Com-plete gives you features you won't find in other DC systems... or even a combination of packages. Things like *Absolute Task Protection*. That means no application can affect the integrity of the network or another application — because each application is insulated by hardware storage protection.

Instant On-Site Support: Only from Software AG.

With this remote dialup technical support facility, a phone call — day or night — brings the expertise of our top DB/DC professionals right to your computer room.

Natural: The way an interactive Data Base Language should be.

Only Natural lets you communicate directly with the data base. And you can forget the complex mechanics of the batch/file age. So by saving programmer and computer time, you save yourself money.

Terminal screens are easy to design, and your programs will be independent of the TP monitor.

Start your countdown today.

Mail the coupon today to get the power of a DB/DC environment on your 360, 370, 303X, or 4300 computer. Or call Sunday Lewis at (703) 860-5050.

Software AG of North America, Inc.

Reston International Center
11800 Sunrise Valley Drive
Reston, Virginia 22091/(703) 860-5050

I'd like details on:

Adabas
 Com-plete
 Instant On-Site Support
 Natural

Please call to arrange a presentation

Name _____

Company Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Type of Computer _____

Operating System _____

1210

Software AG
OF NORTH AMERICA, INC.



'Well, as Near as I Can Figure, It's Just in a Bad Mood.'

Two Ways to Reduce Gobbledygook

Ruth Schiff Winett

"Where you go, I will go, and where you stay, I will stay. . . ."

"But in a larger sense we cannot dedicate, we cannot consecrate, we cannot hallow this ground."

This is the eleventh in a series of articles on better writing.

Without formal schooling, the biblical Ruth and the almost mythical President intuitively knew the effectiveness of using parallel structure. Two methods of reducing the gobbledygook in technical writing are to use parallel structure and to use the active rather than the passive voice.

Parallel structure simply means that ideas which have similar meanings are cast in similar form: "I came, I saw, I conquered." Consequently, if words,

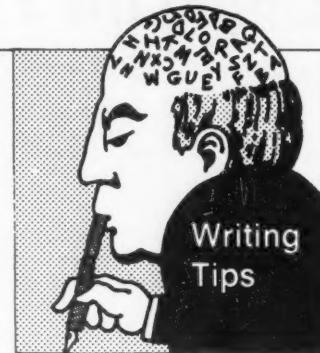
phrases, or clauses are joined by conjunctions such as "and" or "but" or correlatives such as "both . . . and," "not only . . . but also," "either . . . or" and "first, second and third," they should be parallel in content and in structure.

Example 1: To write a program, testing the program and having completed the documentation — these were her goals.

Remedy A: Writing and testing the program and completing the documentation — these were her goals. (The revision contains a series of gerunds, or verbs plus "ing".)

Remedy B: To write the program, to test the program and to finish documentation — these were her goals. (This revision contains a series of infinitives. Whether or not "the program" is repeated before each item in the series is inconsequential.)

Example 2: During the meeting we will focus either on technical staffing requirements or on how to bill customers.



sive when there is a compelling reason for stressing by whom or by what. Active voice is much more direct and to the point. Writers who use the active voice tend to achieve greater reader involvement in their articles.

Example 7: The program was run by the operator. (Passive)

Remedy: The operator ran the program. (Active)

Example 8: The door must be closed by staff members or the air conditioning won't work efficiently.

Remedy: Staff members should close the door so the air conditioner will work efficiently. (Notice how much more forceful active voice and positive form are than passive voice and negative form.)

Example 9: John's job is to be run before Sarah's job is run.

Remedy: Run John's job before running Sarah's job. (The imperative is more immediate and more direct than the passive in this sentence.)

Example 10: The job was run by the operator after the programmer fixed the bug.

Remedy: After the programmer fixed the bug, the operator ran the job.

Recently there have been several attempts to improve the quality of writing. For example, shortly after his election, President Carter declared that government writing should be shortened and clarified.

Admirable as his attempt was, the President was not wholly successful. The Postal Department, for instance, issued a document thousands of words long on how to mail a package!

Robert Gunning developed a method for identifying unclear writing in his book *The Technique of Clear Writing* (McGraw-Hill). To use Gunning's "fog index," writers must add the average sentence length to the percentage of hard words and multiply by .4.

Gunning claims that readers may not be able to understand articles with a "fog index" greater than 12.

It seems, however, that it is far more profitable for writers to learn to identify and eliminate awkward and unclear constructions than for them to waste time applying mathematical formulas to sentences. Some of the constructions writers should learn to eliminate are dangling modifiers and passive constructions.

In addition, writers should become accustomed to using parallel structure to convey related ideas. An excellent reference book for matters of style is the recently revised classic by W. Strunk and E.B. White, *The Elements of Style* (New York: MacMillan, 1979).

**ELECTRONICS/MECHANICAL
ENGINEERS, PHYSICISTS
and
MATHEMATICIANS and COMPUTER-ORIENTED
PROFESSIONALS**

GS-9/11/12 \$17,035-\$32,110
Salary Level Depends Upon Qualifications
Positions Available at Dahlgren, VA and Silver Spring, MD

Opportunities for professionals in the research, development, test, and evaluation of naval systems, including guidance, navigation, tactical command data processing, nuclear effects, radar, EMI, EMV, EMC, safety engineering, gun/weapon/missile control, electro-optical, and ballistics.

Excellent opportunities for advancement, rotational assignments, travel, and paid career development programs at nearby universities. Cultural and recreational activities in abundance at both locations. Dahlgren, Virginia, rural tidewater location and Silver Spring, Maryland, Washington, D.C. suburban location. Send resume to:

NAVAL SURFACE WEAPONS CENTER
Attn: Code P70 (D) Dahlgren, VA 22448
Call Chris Alworth collect
(703) 663-8507/8941 or Autovon 249-8507/8941
An equal opportunity employer - U.S. citizenship required

GOOD CRT'S COME IN SMALL PACKAGES



Who says a CRT terminal has to be big and bulky to do a good job? At Ann Arbor Terminals, we offer a full 15-inch screen and detached keyboard as standard on all our desktop terminals. And the case is only 14" wide by 15" high by 13.6" deep.

We're known throughout the industry for our high quality and reliability. On top of this, we probably have the widest range of available options in the field. Display formats from 256 to 4800 characters. Foreign language character sets. Special command sets. Custom keyboards. Editing, protected fields and block transmit.

And if your application doesn't lend itself to a desktop terminal, we offer display controllers (especially good in industrial environments) for use with free-standing monitors. Or buy our terminal without the case and mount it in your own console.

So when the CRT is the focal point of your system, why settle for a large case and small screen? You can have excellent readability without taking up a lot of room. And get the features you need. Call us for more information at Ann Arbor Terminals, Inc., 6175 Jackson Road, Ann Arbor, Michigan 48103. Tel: (313)663-8000. TWX: 810-223-6033.

ANN ARBOR
TERMINALS INC.



'Galgay, Please Take Your Computer Operating Job More Seriously.'

Compared Against Personal Micros Plato in Eye of Florida Education Controversy

By Jay Woodruff

CW Staff

TALLAHASSEE, Fla. — The State of Florida Department of Education may be headed toward a showdown on what kind of hardware and software it will use to improve the education of its children.

Lines are being drawn between Control Data Corp.'s Plato, a computer-aided instruction system that is now used in five of the state's high schools, and stand-alone offerings from Apple Computer, Inc., Hewlett-Packard Co. and others.

"Personal computers are the wave of the future not only in schools, but in the home," according to Dr. Alfred Bork, director of the Educational Technology Center at the University of California at Irvine. Bork is one of three consultants who were recently invited to aid a Florida study of alternative methods of instructional computing.

Bork criticized Plato as a "dinosaur," contending that it is too expensive, potentially less reliable and less capable than micros, especially in terms of graphics capabilities.

In addition, technology favors the personal computer because its volume production can lower the cost of educating a student, Bork said.

Extension Funded

Meanwhile, the Florida Legislature has allocated \$792,000 to Florida State University to introduce Plato into four more

schools, according to an account in the "Florida Educational Computing Project News," a newsletter for those interested in educational computing.

Bork disagreed with the action. He compared a large centrally based mainframe with remote terminals throughout state schools — Plato — with a microcomputer that services the needs of one school.

Communications-bound systems such as Plato are in trouble because the Bell System is gradually replacing its monthly charge for local calls with per-time-unit charges that will increase the cost of local networking arrangements, Bork noted. A Michigan educational networking system was "wiped out" by per-unit charges when they were instituted in that state, he said.

Concerning reliability, Bork maintained that a CPU connected to 1,000 terminals will affect more users if it goes down than will a smaller system connected to 40 users.

Further, personal computers can offer greater graphics performance, largely because they are not dependent on the speed of transmission from the central-site computers for animation. "You can do nice animation on Apple computers using Pascal. Standalone CPUs are so cheap that makers can design separate CPUs to handle graphics," he continued.

However, Dr. Jess Poore, di-

rector of the Florida State Computing Center and a proponent of Plato, disagrees on the questions of cost, capabilities and Plato's relative performance compared with smaller computing systems.

For one thing, cost should be measured not by cost per student, but "cost per educational event" — the time it takes to complete a teaching task, Poore said.

"I can at least say that during a one-year study in three schools, it cost about \$150 to raise a student from grade 5.8 to grade 8. The students were 11th and 12th graders who might not have learned otherwise," he said, referring to a remedial course offered on Plato. The director did not think the \$150 cost was expensive.

Plato is the only system that offers such an extensive and coordinated curriculum of coursework for students, he added. For "hard-core educational problems," Plato is alone in the field, he said.

For instance, it offers a 400-hour package designed to prepare students for high school equivalency tests, and "nobody else has it."

"In the future, when a couple of hundred hours of coordinated curriculum are available on a small system like an Apple, then we can talk about comparisons," he said.

'It's Not a Contest'

What type of system can best educate a student? Poore

indicated that until something better comes along, the Plato method works best for the learning problems the Florida educators are trying to solve.

"We have scores of micros here. It's not a contest. It's using appropriate technology for the problem at hand," he maintained.

Poore said Plato is a "live and evolving system" whose terminals use the same high-performance chips found in most of the micros to which it is compared. Other than color graphics, which are under development, Plato users can perform approximately the same graphics work as the other available systems.

High transmission speeds are not needed to produce complex graphics such as anima-

tion because once the application is downloaded to the micro in a remote terminal, the mainframe does not have to transmit every part of the movement in order to produce the animation, Poore said.

But when one is talking about basic educational needs, graphics performance is not of great importance: "Animation is only of marginal value when teaching arithmetic," Poore remarked.

Regardless of present cost, the main thing is to realize that until a better developed program appears on the horizon, the Plato system has been helpful and stands alone among the micro systems with which it has been compared, the director said.

Dumb health insurance.

Now you can have extended warranty coverage on your Lear Siegler ADM 3A terminal for just \$72 per year. Start your "Dumb Terminal" extended warranty today by calling Lear Siegler Data Products Division at (800) 854-3805, ext 215. Smart and intelligent service contracts are also available at equally attractive rates.



The Vendors,
The Users,
The Developers,
The Dreamers

Computer Graphics

The only monthly magazine devoted to the most dynamic area of computer application today!

12 issues (one year) for only \$25.00

Please enter my subscription to Computer Graphics for one year.

Name _____

Company _____

Address _____

City _____

Signature _____

Exp. date _____

Payment Enclosed
 VISA or Master Charge

Return to:
Computer Graphics
54 Mint Street
San Francisco, CA 94103

Call for Papers

ASSOCIATION FOR COMPUTING MACHINERY 1980 ANNUAL CONFERENCE, Nashville, Tenn., Oct. 27-29.

"Previewing the Computer Age" is the theme of the conference, which will focus on computer technology, products and services that will have an impact on the 1980s.

Theoretical, state-of-the-art reports, reviews or tutorials are invited on any aspect of computer research, development or application. Papers submitted must not have been previously published or presented, should not exceed 15 typewritten pages and should include an abstract and bibliography.

Five copies should be sent by Feb. 18 to Dr. Gordon Sherman, Techni-

cal Program Chairman, ACM '80, University of Tennessee Computer Center, Knoxville, Tenn. 37916.

FIRST ANNUAL CONFERENCE OF THE NATIONAL COMPUTER GRAPHICS ASSOCIATION, INC., Arlington, Va., June 16-19.

Subjects to be covered include new developments in applications of computer graphics; hardware and software in such fields as management, information systems, computer-aided design, engineering and scientific research.

Information on requirements for participating or submitting papers is available from the National Computer Graphics Association, Inc., Suite 512, 1129 20 St., N.W., Washington, D.C. 20036.

The manual, which will be updated every two years, is available from ICCP at 35 E. Wacker Drive, Chicago, Ill. 60601. It will be shipped via fourth class mail and should be delivered about a week after the order is received.

EDITORIAL

Needless Confusion

The worst fears about software incompatibility with the new DOS/VSE operating system announced by IBM with the 4300 series of processors apparently will not come true — at least not now.

While most vendors of applications and utilities have reported few problems converting to DOS/VSE operation, the news from the more complicated data base management systems (DBMS) front was not in until last week — and the news was good for users.

All vendors of such systems reported that their products would work in the IBM 4300 environment [CW, Dec. 3]. DBMS are complicated and complex; if they can run under DOS/VSE, it is likely that most user-written code will also run with the new IBM computers.

It's too bad, however, that the industry had to wait almost 10 months to be sure that products designed to run on IBM equipment would in fact run on the newest of the IBM product line. This delay — until enough systems were installed to test the independent products — caused confusion in both the industry and in the computer-using community.

IBM could overcome this problem by providing independent vendors with earlier information on its new software systems and by providing technical details of the new systems when they are announced. In addition, it could set up a testing service with some of its early machines so that independent vendors could check out their products on the new equipment and under the new operating systems.

Unfortunately, however, IBM does not do any of these things, which would make life easier for both the independents and the user community. It apparently sees some benefit in the confusion it causes every time it announces a new computer with new operating systems software.

Up and Operating

Well, CW Communications, Inc.'s move into new facilities in Framingham, Mass., has been completed. After a hectic weekend, everything is in place and *Computerworld* is up and operating.

However, as with any undertaking of this sort, there are some problems. If you have run into any delays trying to reach us, please bear with us.

By the time you read this, everything should be operating well, but we are apologizing in advance for any problems you may have had last week.

Our new address is 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701. The new phone number is (617) 879-0700, and the new Telex number is 95-1153 COMPUTERWORLD FMH.

DATA PAST

Five Years Ago

Dec. 11, 1974

HUDSON, Mass. — The Society of Certified Data Processors (SCDP) proposed legislation that would regulate the data processing profession. The legislation would set up state boards of registration to rule on who could "practice data processing" or call themselves "data processors" or "computer professionals."

WASHINGTON, D.C. — The General Accounting Office began investigating allegations that members of the oil and gas industry could access confidential regulatory information

through an on-line computer system that would soon be operational at the Federal Power Commission. The contract for the \$10 million system was awarded in July to Planning Research Corp., a company whose subsidiary, Foster Associates, represented petroleum interests in Washington.

Eight Years Ago

Dec. 8, 1971

WASHINGTON, D.C. — Computers are "the key U.S. contribution" to South African apartheid, according to The American Committee on Africa, which said a computer system would be used to compile dossiers on all blacks in South Africa.



'This is your controller speaking. Please hold current coordinates until the computer comes back up...'

LETTERS

Laws of the Land

The American judicial system is not as parochial as the article entitled "Lawyer Involvement in System Design Defended" implied [CW, Nov. 26]. Quoting (misquoting?) an official of the American Bar Association, the article said that "no state will enforce a law of another state . . ."

As a practicing lawyer, I can tell you that this simply isn't so. In interstate business transactions, a court in one state will routinely apply the law of another state of the U.S. under well-recognized principles governing conflicts of laws.

The article's focus was on drafting contracts. A well-drawn contract often contains a choice of law clause, which specifies the state whose law is to be applied in construing the agreement. The parties' choice of law expressed in a contract is generally followed by the courts, provided that the state chosen has some reasonable connection with the transaction.

Kenneth P. Carroll
New York, N.Y.

Poor Choice of Models

The article "Towards Software Engineering" by Gopal Kapur [CW, Nov. 12] was correct in its attempt to state that structure values come mainly from the use of pre-coded models. I feel it unfortunate that the choice of models leaves something to be desired.

While a sequential model would have been an asset five years ago, it is out of place today. We are trying to forget the horrible sequential syndrome. We do not appreciate having it raised to a place of importance.

My personal opinion is that three structured models can handle everything. They are Edit and Update, Extract and Report. I feel you cannot separate Edit from Update, as validity is

not final until you compare the data to an existing file. I would relish the chance to present an updated version of the concepts presented in this article.

A. Vasek

Grand Rapids, Mich.

'Become' With It?

Terence Hughes almost wrote a very good letter concerning poor use of words [CW, Nov. 19].

I do agree with him, by stretching his argument a bit, that the Italians would probably not like to have their ancestors called Ropersons.

However, he ruined the effectiveness of the letter by ending it with "Get wise, girls."

No one can "get" wise. Become wise, Terence.

Dave Withans

San Jose, Calif.

To The Rescue

I would like to communicate with individuals or companies that have converted from the IBM 360/20 disk and card system to an IBM System/34. I can be reached through my office at P.O. Box 5365, Beaumont, Texas 77702.

We'd prefer someone in a manufacturing environment, but would be glad to hear from anyone. Help!

Harold Core
John Dollinger Jr., Inc.
Beaumont, Texas

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, Computerworld, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

READER COMMENTARY/Gregory Enholm and Theodore Rueter

Cards Better Than Coupons for Gas Rationing

Now that Congress has granted the President standby gasoline rationing authority, the mechanics of a possible rationing plan must be discussed. As of yet, public debate has assumed that the coupon-based rationing of World War II will be reintroduced. If the nation is to avoid a system that involves "44 million new booklets and 44,000 additional bureaucrats," as Sylvia Porter wrote in a recent column, alternatives to coupon rationing must be considered.

We propose to utilize advances in computer technology: Rationing could be accomplished by issuing each driver a credit-card-size gasoline rationing card readable by devices provided to gasoline stations. Two variants of this proposed card system are already in use: after-hours bank teller machines and the Washington, D.C., area subway fare card system.

Card-based rationing would provide advantages with respect to administrative efficiency, lessened fraud, moderation of gasoline prices and energy conservation.

Is Rationing Necessary?

The disappearance of gasoline lines has convinced many that rationing is a dead issue. This is myopic: President Carter's oil import quotas and the prospect of continuing tight supplies necessitate standby rationing. So, too, do the other possible causes of an oil supply shortfall.

In the June 4 issue of *The New York*

Times Magazine, Harvard lecturer Daniel Yergin wrote: "There could be a natural disaster. Or an accident or a terrorist strike in the oil fields or in the narrow straits leading to the Persian Gulf. Or the growth of the Soviet presence in the region, some new twist in the Arab-Israeli conflict or a struggle for preeminence among Saudi Arabia, Iraq and Iran. Or a shift in the outlook of the elite that runs the Saudi Kingdom. Or — and this is the very real danger that Western officials prefer to close their eyes to — a coup in Riyadh and the accession to power of a radical like Libya's Colonel Qaddafi."

Recent events in Iran and Libya have demonstrated the types of problems that can arise.

The alternative to direct rationing is rationing by inconvenience or price. Rationing by inconvenience has no political appeal and equally little intrinsic merit. Rationing by price discriminates against the poor, leaves prices to the discretion of the Organization of Petroleum Exporting Countries and the oil companies and is based on the faulty assumption that demand for gasoline is elastic.

Sylvia Porter proposed rationing by

(Continued on Page 26)

HUMAN CONNECTION/Jack Stone

What Makes Programmers Run?

Motivation of DP personnel is a matter of increasing interest within the academic community. You may have noticed results from new research on the subject that appeared recently in the trade literature.

I want to report two events that occurred late in October. The first took place at the annual meeting of the Association for Computing Machinery (ACM) and the second at the annual meeting of the Association of Computer Programmers and Analysts (Acpa).

At ACM, I was privileged to be a member of Roy Cottrell's panel which gave verbal reports on progress in computer personnel productivity research. I was particularly impressed by one of the participants who sought to build the ultimate taxonomy of factors influencing programmer motivation. He showed charts of what seemed like 50 or so of these factors, which fell into psychological, sociological, organizational, personal, educational and other realms.

All of this was overwhelmingly impressive, until he made the observation, "Of course, these parameters generally interact with one another and, therefore, it's very difficult to isolate any particular one for the purposes of scientific measurement." Well, I'm a strong proponent of such research as long as I don't have to spend my career at it.

I have a far greater interest in not waiting until the research data is all in, but moving ahead and addressing — or, better said, seeing others address — the pragmatic motivational problems of the computer center using common sense Which leads to the Acpa meeting.

I was one of the Acpa luncheon speakers and gave a talk on the need for improved human communications to enhance managerial and systems successes in the industry. I conducted a nonscientific survey — using the nonstructured show-of-hands gambit (a methodology which, for a change, costs no time or money). The audience, a group of about 70, was about one-third DP managers/supervisors and two-thirds technical personnel.

Different Response

My questions dealt with their perceptions of how they viewed others (users, management and so forth) and

how they thought others viewed them. Except for one question, an overall conclusion was that about 30% of the attendees had positive external relationships and the balance were negative.

The one question that evoked a radically different response went something like, "Do you feel your top management is supportive and understanding of the data processing activity? Put another way, are you happy with your management?" A grand total of one person answered "yes."

I happened to run into this fellow after the meeting and asked him why he answered as he did. His response was a pragmatic set of guidelines which seemed to be as good as any I've seen for motivating a systems department without dedicating half the center's resource to the task. I have capsulized them below:

- A short- and long-range forecast in job opportunities is made available to all employees, so they know for what jobs they can compete.

- Everybody is evaluated using easy-to-understand, standardized criteria. There is heavy input from the employees. The evaluations are discussed among all the managers so that general agreement is obtained on the relative performance of all members of the staff. Then prospective candidates are matched against future positions.

- Before the positions open up and where practical, the company tries to assign candidates to future managers for preliminary evaluation. Both people involved get a good chance at sizing up the other and deciding whether the matchup will succeed.

Of course, these thoughts do not constitute a dramatic new find in the sociopsychological environment. But they suggest that employees can be motivated when they believe they are being dealt with in an even-handed way; that they have the opportunity to make a contribution to the best of their abilities; that they have a strong voice in attesting to their performance; that exemplary performance will not go unrewarded; that there is a master plan for personnel growth; and that there is a joint evaluation of a new manager and a new position before the person is reassigned.

And, if you will allow me to draw on some further testimony from outside the industry as to the validity of these

statements, this same philosophy has been implemented to the letter by one Jack Pardee and the strategy has made him a candidate for National Football League coach of the year. Go Redskins!

Comments or questions pertinent to the human side of data processing should be addressed to Stone at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

READER COMMENTARY

Daniel J. Sabieski

DP Exports to Soviets: A Dangerous Proposition

Bohdan O. Szuprowicz wrote that the arguments of those who oppose the export of computers and other high-technology products on the grounds that they will be diverted to military uses "are laughable in the face of reality" [CW, Sept. 17].

He argued that the Soviets already have the means to kill us several times over, so that additional technology would not enhance the danger. He also stated that, in any event, the Soviet bloc is manufacturing its own quality equipment so all we would succeed in doing would be to lose a potentially lucrative market.

The fact is that Soviet computers are not being produced in either great quantity or quality and that American computers purchased by Moscow are in fact being put to military uses. Soviet dissident Anatoly Sharansky says he worked with American computers while in the Soviet military.

M. Glushkov, director of cybernetics at the Soviet Academy of Science, has written in *Izvestia*: "The best computers made in the Soviet Union operate only a few hundred hours between failures, while ancillary devices break down practically daily, and the information stored on tape cannot be stored without some loss for more than a month."

Soviet physicist Andrei Sakharov has commented: "The second industrial [computer] revolution began, and now in the 1970s we can see that rather than catching up with America we are falling farther behind The gap between the two is so wide it is impossible to measure it. We simply live in an-

other epoch."

Overkill, too, is a meaningless statistic. It could be argued that we have enough rifle ammunition on hand to kill the Soviets a dozen times — on paper. Doing it is another matter.

Overkill assumes your weapons will work, that the enemy will mount no defense, will take no measures to protect its population and industry and will not strike back with its own weapons. Clearly, this is not the case.

The Soviets are obviously not aware of their ability, since they are building more weapons at an unprecedented rate. Or perhaps they realize that technology does not stand still, that seemingly invincible offensive abilities are quite quickly and quite inevitably nullified by defensive technologies. Those nations who revel in their overconfidence soon suffer the indignity of a Pearl Harbor.

Lagging Behind

In point of fact, the best Soviet-made computers are believed to lag at least three years behind widely available American counterparts in processing speed, eight years in memory capacity and a decade in peripheral apparatus as well as a decade behind in software.

To the quality gap must be added the quantity lag. There are only 25,000 computers in the Soviet Union, two-thirds of which are used for military purposes. The U.S. employs more than 300,000 computers, one-quarter in military applications.

The principal reason why the Soviets are so far behind in computer technology is

(Continued on Page 26)

THE TAYLOR REPORT

Alan Taylor

Honeywell Should Provide Answers — Not 'Policy'

The successful Honeywell, Inc. Level 6 has had its production cut. As a result, the corporation has broken the delivery schedules it published to guide prospects and get orders. The corporate failure seems to have started about October and hopefully will last only until next March.

The reason for the broken promises is that Honeywell had not obtained its integrated circuits and, as a result of shortages in the market, will not get them in respectable quantities until next year.

In dealing with the problem, Honey-

well spokesmen have resorted to Madison Avenue techniques of indirectness, simply referring to "mistakes" and using IBM as a potential scapegoat. In fact, IBM is serving the tarnished Honeywell image in two capacities — by being the setter of the industry standard of irresponsibility for broken delivery promises and also by being the rumored buyer of massive quantities of integrated circuits.

IBM's purchases, the theory goes, have been the cause of Honeywell's inability to get integrated circuits it knew it needed to make promised deliveries.

Check Your Delivery Rights

The rights of a user to get delivery as promised by the salesman, or by the corporation itself, are limited by the contract — notwithstanding any proposal or written or oral promise outside the contract.

Typically, computer contracts do not contain any delivery promises themselves and often directly withdraw and disown the delivery schedules and promises that have been separately provided.

To check your agreement, quickly look for these two clauses:

• **Entirety of the Agreement.** This is normally a short clause on the last

or next-to-last page of the master contract. It simply says that nothing outside the agreement matters. Sometimes it specifically goes on to disown other communications, letters, proposals and so forth.

• **Delivery date.** This is probably not there or is only a statement that the equipment is "scheduled" for delivery on such a date.

If you have an "entirety of the agreement" clause and don't have a clear delivery date promised in the agreement, then call your lawyers if you want to be protected.

Honeywell's official position on the Level 6 varies in its explanations. The first explanation for the situation

is the system's success. Circuit shortages are not mentioned here, and longer, but not broken, schedules are involved. On being challenged, the company describes the situation as a mistake, and the circuit shortage is acknowledged as having caused production to drop, although it is planned to increase.

Shelter From Responding

"Policy" is used to shelter the corporation from having to respond and identify just how bad the production drop is. (Rumor puts it as being more than 75% to 80%).

Users are left with the clear impression that not only does Honeywell make promises without ordering the needed parts, but also that it is concealing the facts as a matter of policy.

From this comes the question as to how users can rely upon Honeywell's claim that the only delays are for those Level 6s scheduled for delivery in the fourth quarter of 1979, which are being delayed until the first quarter of 1980.

Industry Standard Problem

The real problem arises because, as Honeywell brings out, industry contracting standards permit delivery promises to be broken (see box). What is not so traditional, however, is the use of policy to cover the situation after such promises are known to have been generally broken. Honeywell, being a public company, has to report anything material to the Securities and Exchange Commission, and while the fourth-quarter profits of the entire corporation may not be impacted, the serious reduction of the Level 6 production lines certainly has an impact on the business line concerned.

Shortages in electronics seem to be growing, but also seem to be controllable by forward-looking corporations. Honeywell has failed to provide some tangible, written information that both reassures disappointed customers that the next promise will be kept and that money is available and being used to order components in time to safeguard promised production.

This approach hurts the entire industry. It suggests that the sellers of information regard information as a propaganda weapon to be used to provide 1984-style misinformation.

The trusting users deserve better information than this.

DIGITAL'S PDP-8. Some things never go out of style.

Digital's PDP-8 was a sound investment in '65. It's even sounder for the '80's. For three good reasons:

First, there's not a more mature minicomputer on the market. So if you're an end user and it's bug-free performance you want, you want a new tried and true PDP-8, with a choice of processor.

Second, you have a choice of system software like no other minicomputer offers. Plus thousands of user-contributed application programs through the Digital Equipment Computer Users Society (DECUS). So you're already a step ahead.

Third, you can expand your PDP-8 system anytime with a wide range of warranted, off-the-shelf add-ons. Including floating point processor, mass storage, programmable clock, serial line interface, 4-channel interface, 20-slot expansion box to name a few. So staying stylish is no problem.

Call us on 800-258-1793* for details, complete and mail the coupon to the address below, or contact your local Digital sales office.

*8:00 AM to 5:00 PM, EST, Monday through Friday. New Hampshire, Alaska and Hawaii Residents dial (603) 884-7240.

<input type="checkbox"/> Please call me, I have an immediate need for the following:
<input type="checkbox"/> Memory
<input type="checkbox"/> Mass storage
<input type="checkbox"/> Printers
<input type="checkbox"/> Terminals
Other _____
<input type="checkbox"/> Please add me to your mailing list.
Name: _____
Organization: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____

B-12-10-4

Digital Equipment Corporation
Traditional Products
522 Amherst Street
Nashua, New Hampshire 03060

digital

* Copyright 1978 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for noncommercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

New From Raytheon:

A 3274-type SNA-compatible terminal that is upgradeable and programmable.

Picking a 3274-type terminal is like selecting a commodity. You can choose from a number of look-alike alternatives.

Until now!

Now, Raytheon Data Systems has introduced an "intelligent" 3274-type terminal system. It's part of our widely used PTS-100 terminal family.

Our new terminal does what most 3274-type products do. It emulates the large-cluster IBM 3274 display system. It supports from one to 32 remote devices. It offers both bisynch and SNA/SDLC emulators. It has cursor select, controller-managed keyboards and other advanced features. The system is plug-compatible at a coax cable level.

Other 3274-type devices have those capabilities too. But, of all the 3274-type terminal suppliers, only Raytheon offers these advanced features.

Upgrading. Because it is part of our PTS-100 family, our new terminal can be upgraded by users in the field from 2260- to 3277- to 3278-type performance. One system that supports three operating modes. That saves terminal equipment costs and adds great flexibility to your network structure.

Programming. Raytheon's 3274-type terminals are fully programmable. You can store formats. Execute local print commands. Write or modify func-

tions. Use variable device addressing. All without mainframe involvement.



Simple operation. Our new terminal system has an interactive configurator, which speeds up initial installation and allows for rapid reconfiguring. Thus, it eliminates labor-wasting complexity when using 3274-type displays.

Customizing. Because it is intelligent, our new system can be custom-titled to your needs. With special keys, keyboards, program functions, printers and the like. Easily and quickly.

Little extras. A display that is smaller. A non-glare, non-smudge screen. A full-screen display. Field installation of

every device at no extra charge. But you get the point.

Raytheon's new PTS-100 3274-mode terminal systems are available now. And at less cost than most alternative products.

Find out more by contacting the Raytheon Data Systems sales office near you. Or send us the coupon.

Raytheon terminals. 100,000 now, and growing fast.

Tell me more about the Raytheon intelligent terminal and distributed processing family:

- PTS-100/BSC
- PTS-100/SDLC
- PTS/1200

- Have a salesman call.
- Send me more information.

Name _____

Title _____

Company _____

Street _____

City _____

State _____ Zip _____

RAYTHEON

RAYTHEON DATA SYSTEMS

Intelligent Terminals Distributed Processing Systems Word Processing Systems Minicomputers Telecommunications Systems

1415 BOSTON-PROVIDENCE TURNPIKE - NORWOOD, MASSACHUSETTS 02062

Call Director, Field Marketing, at (800) 225-9874 (toll free) Inside Massachusetts call (617) 762-6700 TWX: 710 336-0646 TELEX: 92-4408

Word Processing Division: Lextron Corporation, 9600 DeSoto Avenue, Chatsworth, California 91311 (213) 882-5040



READER COMMENTARY/Michele Landon

Software Putting Programmers Out of Business

In an industry where hardware becomes outmoded before it is installed and software is phased out before it is even debugged, have programmers become obsolete before the first generation has settled into retirement?

Anyone who reads the classified ads may doubt my sanity for raising this question. Companies are begging for programmers; some are even paying bounties to employees for bringing in a programmer.

This ideal supply and demand situation is, alas, not destined to continue, and it is the industry itself which will end it. In an effort to meet the growing demand for programmers, we will create software that will unfortunately but unavoidably eliminate programmers.

Take, for example, IBM's Development Management System (DMS), a software package that runs under CICS and whose purpose is to produce quick on-line systems. The basic premise of DMS is that most on-line systems involve either resource assignment or file building and maintenance.

A further breakdown of file functions are ADDS, INQUIRIES, UPDATES, DELETES and BROWSES. These functions, of course, apply to any files whether Master, History, Validation or Open (for transaction).

Furthermore, the problem of resource assignment is really a matter of file correlation — a match of an open problem file with a personnel file, for example. So much for the systems analyst/designer.

Now for programmers and coders. The next premise is that most on-line application programs involve several basic functions: File Control, Display Control, Message Control, Hierarchy Management, Data Manipulation, Communication Field Management and Error Panels. DMS provides the building blocks to do most of these functions now; those which are lacking will be included in later releases.

Special panel forms are supplied. The programmer fills out the form, translates it to cards and runs the cards through a DMS assembler, which basically generates the on-line program.

The ultimate aim is to make the process so easy that users can write their own programs. Now, the argument might be made that users won't want to code forms. But have faith — in future releases, the coding will be done interactively.

So, in fact, users will be code-freeing the programmer for more important tasks — such as waiting in unemployment lines, or maybe training for a new trade!

These types of products are much more of a threat to programmers than the stylized programs that were around previously. First of all, DMS is not performing one precise function; it is for generalized coding. Secondly, it will be done interactively, which makes it convenient for users.

But third and most important, it is breaking down design and coding

principles to basics and stripping us of our "mystique." No longer will we be able to listen to users' requirements and tell them that x man-months and y dollars later we will somehow magically produce their system. The user group may very well decide to design and code the system itself.

So goes our powerful centralized DP departments. So goes the programmers and analysts, the DP schools and, last but not least, our DP recruiters.

Will we go down in history as the profession that created and destroyed itself in 25 years? Or is there hope that we can somehow — with our logical, orderly, well-programmed minds — create a logical child to the data processing profession?

Landon is technical supervisor of the Hartford (Conn.) Group.

READER COMMENTARY/Robert Shullich

Where Is Your Garbage Tonight?

Today companies pay thousands of dollars to protect their data. This protection ranges from the lock on the computer room door to sophisticated data encrypters. A good data encrypter package could go for as much as \$40,000.

What good does all this security do if input and output are not protected? Yes, even the input to a computer run can contain enough information to put a company out of business.

The DP field disposes of computer printouts and cards in many ways. The most common ways are incineration, recycling and regular trash disposal.

Many companies are becoming ecology-minded and are recycling computer waste. But many of these companies have failed to ask, "Is my garbage safe after it leaves?"

For those who are willing to chance sending critical data to the recycling center, here is a story of what happened to me when I worked for a university on the East Coast.

The most confidential information that a college keeps is student records. These records include student grades and other specific information that cannot be released without the student's permission. Unauthorized release of such information could subject the college to a lawsuit for privacy violations.

At the end of every semester, a package of cards was sent to each professor. There was one card for each student with the student's name punched

into the card. The professor marked the final grade on the card, which would later be optically read and punched into the card through an off-line process. The cards would then be read into the computer and updated against the transcript master file.

When the time came one month to get rid of 60,000 punch cards, the college followed its procedure to recycle all cards and printouts. Every month someone arrived in a pickup truck to transport all the computer waste to the recycling center.

We loaded all the student record cards, in addition to 30 cases of other cards we used during that particular month. About an hour after the pickup truck left, however, we got a call.

A lady that lived along the pickup truck's route called to report that her whole front lawn was covered with cards that had "FINAL GRADE" written on them. It was later discovered that the pickup had hit a pothole and

the load had not been tied down properly. On this lady's lawn were 11,000 potential lawsuits.

We were lucky — no one found out. The inside joke of the semester was, "If a student wants his final grades this term, let him look in the street."

An accident like this could put a business in serious trouble if the wrong listing got into the wrong hands. Something as innocent as a core dump could be a data center's disaster. An I/O buffer showing transaction formats and passwords to user-supplied security algorithms could be easily extracted and decoded by a systems programmer.

So when an old listing becomes obsolete and is thrown out, think of whether the report is obsolete for someone who can use it against you. That listing you threw out, the one you didn't shred or burn, where is it today?

Shullich is a computer consultant employed by Informatics, Inc.

**DEC
IMMEDIATE
DELIVERY!**

RP05AA
UPGRADEABLE TO RP06

PDP11/40
16K to 128K CPUs

★ **RP04AA/BA**
★ **RP03/RP02**
★ **RK05/RK06**
★ **DS340**
★ **PDP11/03/05**
PLUS 1000s

of MEMORY, TAPE, PRINTERS, MODULES,
POWER SUPPLIES, TERMINALS & MORE!

CALL (617) 261-1100

**AMERICAN
USED COMPUTER**
PO BOX 68, KENMORE STA., BOSTON, MA 02215



**When you need Mag Tape
fast—call PRYOR!**



As with all of our computer supplies, we keep Mag Tape conveniently inventoried for fast delivery by UPS or our own truck fleet. All 1/2" magnetic tape is individually certified for use at up to 6250 BPI. Try us and compare our prices and delivery.

PRYOR
CORPORATION

FULL LINE COMPUTER SUPPLIES FOUNDED 1959

400 N. Michigan Ave. • Chicago, Illinois 60611 • 312/644-5650

ANNOUNCING AN INDUSTRY FIRST. NETWORKING THAT WORKS.



Up until now, networking has been more promise than performance. Now there's the XODIAC™ Network Management System - Data General's new, user-transparent network software. XODIAC lets you hook-up any number of AOS-based ECLIPSE systems and keep your entire DDP operation right under your thumb. You can even add our other communications products to access other systems.

XODIAC user-transparency means no network-specific programming, less reprogramming, and more control for you. No other computer company can give you networking software that's easier to use.

And XODIAC communications are based on the internationally recognized X.25 protocol from CCITT so you can access public data networks like Telenet in the U.S., Datapac in Canada, and Transpac in France. XODIAC Network Management System. It works. For more information, call or write, or send in the coupon.

Data General Corporation, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., Ontario, Canada. Data General Europe, 61 rue de Courcelles, Paris, France, 766.51.78. Data General Australia, (03) 89-0633. ECLIPSE is a registered trademark and XODIAC is a trademark of Data General. © Data General Corporation, 1979.

Mail to: Data General, Westboro, MA 01581. I want Networking that works.
Send me complete information on XODIAC for: ECLIPSE Data Systems
 NOVA and MicroNOVA Systems Have a salesman call.
Tel. _____

Name _____
Title _____
Company _____
Address _____
City _____
State _____
Zip _____

The Computer Connection
1000 Main Street
Westboro, MA 01581
(508) 366-8911

Marking End of File

I have read with interest the various ways in which several authors have applied the structured methodology to the file/transaction processing task using the Cobol language. Anthony F. Vignone's model in the Nov. 26 issue was the best yet and certainly points out the goals of structured design.

What all of the writers have overlooked in concentrating on the lower level sections or on the issue of the "priming" READ, is the ambiguous use of a high-valued key value to mark end of file.

Reading the statement (from Vignone's model) "PERFORM SELECT-SALES-RECORD UNTIL TRANKEY EQUAL HIGH-VALUES," one is led to wonder if there are high-valued keys used to mark the end of or divisions in the input file. The PERFORM statement as written does not tell the reader that an end-of-file condition is the real criterion for termination.

The program will ignore input if a high-valued key appears in the input data stream. Because the data item TRANS-KEY is referred to after end of file, it must be located in the WORKING-STORAGE SECTION, necessitating an extra move of the record from the input area into WORKING-STORAGE SECTION for each input record.

The use of 88-level entry end of file flag data item increases readability and prevents a program error if a high-valued key is encountered in the data. My suggested solution follows:

WORKING-STORAGE SECTION
01 END-OF-TRANS-FLAG PIC X(3).

88 END-OF-FILE-TRANS VALUE 'END'.

...
REFORMAT-THE-TRANS.
OPEN INPUT TRANS-FILE.
MOVE SPACES TO END-OF-TRANS-FLAG.
PERFORM READ-TRANS.
PERFORM SELECT-SALES-RECORD UNTIL END-OF-FILE-TRANS.
CLOSE TRANS-FILE.
SELECT-SALES-RECORD.
IF SALES-RECORD
MOVE TRANS-KEY TO SORT-KEY
MOVE TRANS-DATA TO SORT-DATA
RELEASE SORT-RECORD.
PERFORM READ-TRANS.
READ-TRANS.
READ TRANS-FILE
AT END MOVE 'END' TO END-OF-FILE-TRANS.

Kevin W. Davidson

Greenville, S.C.

Insults to Professions

Were the Reader Commentary articles in the Nov. 26 issue planted there to insult and outrage members of my profession or are Anthony Vignone, Edward Talbot and Chris Rohrs living proof of the ignorance and ineptitude prevalent in today's data processing environment? If the latter is true, I can see why members of the non-DP community feel like victims.

Allen B. Savin Jr.

Phoenix, Ariz.

Pitfall With GOTOS

In reference to James L. Gillaspys letter [CW, Nov. 19] referencing Bruce Sherman's commentary on Cobol GOTOS [CW, Nov. 5], Sherman's code in Figure 3 will work in any "GOTO-less" program since the only path to "REFORMAT-THE-TRANS" is via a PERFORM.

This example illustrates a major advantage of "GOTO-less" code: elimination of the "accidental fall thru." This is a frequently encountered error

LETTERS

in programs that are permitted to include the GOTO statement.

Steve Ryder
Austin, Texas

Too Kind to Code

Pacifico A. Lim [CW, Oct. 1] was too kind to GOTO-less Cobol programming in calling it "unrealistic and rather romantic." A program of any size that uses the PERFORM verb instead of GOTO to implement selection and iteration will contain a proliferation of performed paragraphs and sequences of paragraphs which are artificially displaced from their logical locations in the program.

Such a program will clearly be struc-

tured but not much else about it will be clear, and it will resist maintenance, especially by someone other than the author. Bruce Sherman's examples [CW, Nov. 5] are instructive in showing what can be done in Cobol, but this is not what needs to be done to real programs.

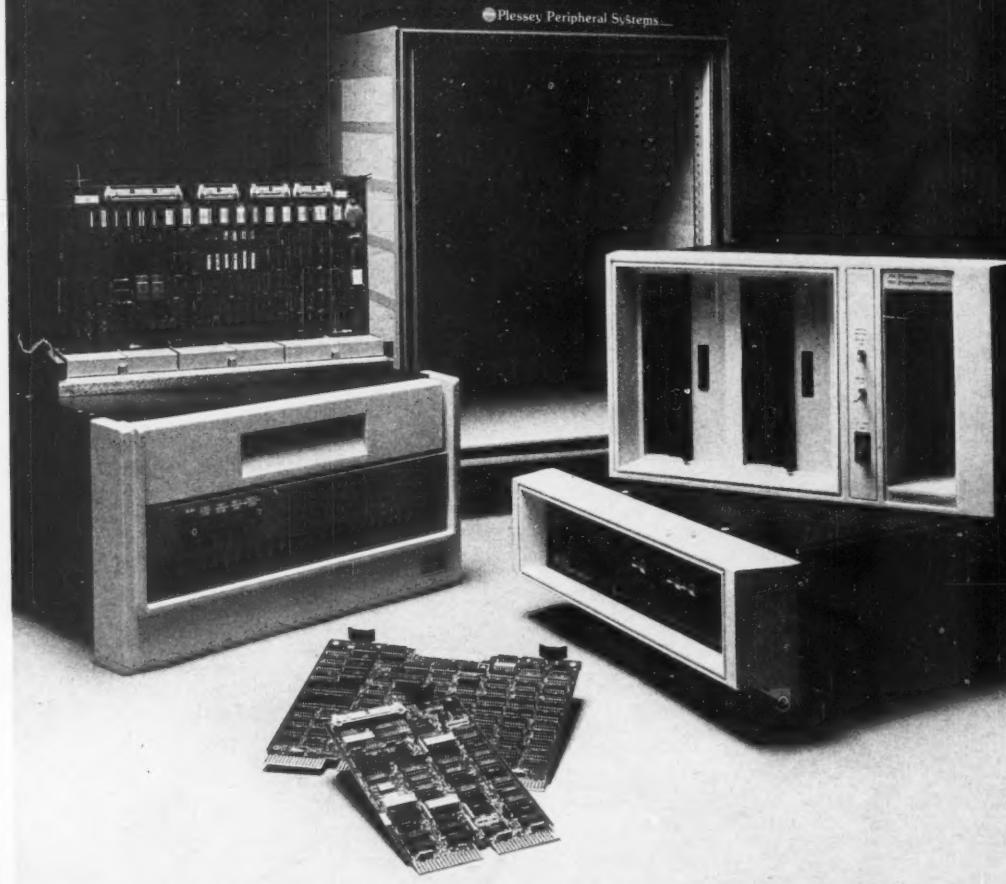
The only desirable uses of the PERFORM verb are to avoid duplication of code and to execute overlay sections. If a program has no overlays, it should have no unique PERFORM statements, that is, each performed sequence should have at least two references. Within the mainline code and each performed sequence, GOTOS can and should be used to create the needed structures.

Lim warned that a GOTO should be avoided "if its use will compromise the readability of the program." The readability of a Cobol program which is oriented to GOTOS instead of PERFORMs can be assured by allowing backward branches only to labels that end with "-LOOP" and forward branches only to labels without this suffix.

Garth Peterson
Sioux Falls, S.D.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

WE'RE OUT TO IMPROVE DEC[®] SYSTEMS. ONE WAY.



READER COMMENTARY/Robert A. Germsinsky

The Forgotten Factor in Converting to DP

When I was assigned the task of moving our company from a manual to a DP system, I was very pleased. It seemed like a fairly routine task, one that could be accomplished with few problems.

I set to work making up schedules and programs, then began to meet with each of our employees individually to explain their roles in the system. They listened politely and asked few questions; I got the impression that I was a great teacher.

As things progressed and we tried to rely more and more on the system, there was a complete breakdown in the work flow. Inaccurately filled out pa-

pers, lack of cooperation and wrong data brought the system to a complete halt.

I held more meetings and again explained what I expected. When I was asked why something had to be done a certain way, I made the mistake of saying, "That's the way the system was designed."

The situation worsened to the point that no billing was being done, but the office staff didn't seem concerned. They thought that as soon as the system was fully on-line, most of them would be out of a job.

Morale was very bad. I had lost control of the situation.

This state of affairs had me worried. I understood the system and saw all of its advantages. Why couldn't anyone else?

Our company is an electrical contracting firm that has been in business since 1922. It was and still is a fairly close-knit organization. Prior to the DP system, people relied on others for help in accomplishing tasks. There wasn't anyone who couldn't do another person's job if the need arose.

With the advent of the computer, this changed. My original course of instruction forced these people to operate on what could be called a "need to know" basis. This was fundamentally

wrong. Anyone who works within an organization must feel that he is playing a vital role in the functioning of that organization.

Educational Campaign

Then it occurred to me that nobody really saw the system as a whole; they only saw their piece of it. When I realized this, the solution to the problem began to take shape.

I started an educational campaign. Going back to the basics of how the computer worked, I explained the entire system first to our line supervisors. I explained to them how a mistake on their part would affect the system downstream. I told them how they fit into the overall operation of the system, not just their part in it.

To our office staff, I explained and emphasized that the computer would not eliminate jobs, but would create them. We needed people to operate the system, interpret the results of reports and to maintain our bookkeeping and accounting files.

The problem was not with our system, or with our personnel, but with me. I had been so immersed in the nuts and bolts of getting this computer on-line that I overlooked the people we would need to make it work.

I found that our people were interested in the computer, what it would do and how it would do it; they were anxious to help. The problem was that they didn't know how, and I had neglected to fully explain to them how they could help.

After my reeducation campaign, the results were quite remarkable. The system operation picked up, morale rose and things began to work the way we had planned when the system was originally designed back in 1976.

We still have problems from the usual bugs that are encountered in the software or hardware. These are being worked out between our staff and the people who sold us the system.

The most important bug, however, was worked out within the company — the function of our people within the DP framework.

Germsinsky is a DP consultant in Plainfield, N.J.

OR THE OTHER.



Once, long ago, Plessey Peripheral Systems only made memories to extend DEC CPU capability.

Times have changed. The plug compatible industry has grown and prospered. So has Plessey Peripheral Systems. We're now the largest independent supplier of DEC-compatible peripherals and systems. Our product line includes add-in/add-on core and semiconductor memories, disc cartridge and disc pack subsystems, floppy disc subsystems, mag tape subsystems, complete computer-based systems with a wide assortment of powerful operating software, and a variety of controllers, interfaces, expansion chassis, and other accessories.

You can buy any number of DEC plug compatible pieces from us and build your own system around a DEC CPU. Or you can buy a completely assembled Plessey system with all necessary hardware included.

Our System.

When you know how to build better peripherals and computer accessories for less, it stands to reason you can put them all together and build a better system.

We do.

Plessey Systems, for example, are available in many configurations: for instance, entry level System 2VX

comes with 1 megabyte of floppy disc storage, while our multi-user System 34E comes with 500 megabytes of mass disc storage.

Compare Plessey's DataSystem IVC with 10 megabytes of cartridge disc storage to DEC's 320 series. The Plessey system runs FORTRAN, BASIC, and MACRO-11 as well as DIBOL. DataSystem IVC provides fully automatic spooling for peripheral devices, requires 60% smaller DIBOL SAV files, and includes an improved single-key ISAM facility and a SORT that's 20 times faster than the DEC equivalent.

It's your choice.

You can pay more for less performance.

Or you can do business with us. We offer a broad, complete line of products. We provide efficient, highly skilled maintenance on any equipment we manufacture or distribute around the world. And as a division of the multinational Plessey Company, we're part of a billion-dollar-plus corporate network, so you know we'll be around if you need us.

Think it over.

Plessey Peripheral Systems can do the job for you. You just decide how you want it done.



Plessey Peripheral Systems

The only real alternative.

17466 Daimler, Irvine, California 92714 (714) 540-9945

SALES and SERVICE in 18 major cities in USA; Canada, Austria, Belgium, Denmark, Finland, France, West Germany, Holland, Italy, Norway, Spain, Sweden, Switzerland, United Kingdom, and overseas offices in Australia, Brazil, India, Japan, and New Zealand.

® Registered trademark of the Digital Equipment Corporation.



'Happiness? Hell, I Dunno — Maybe Being Only Three or Four Weeks Behind?'

Card-Based System Best for Gas Rationing

(Continued from Page 19)

minimum purchase requirements and the use of driver's licenses: "Your license could be punched each time you got gas. If purchases were permitted twice a week and rationing had been in effect for two months, you could buy gas only if your license had been punched in the spaces showing 16 purchases or less. This would enable you to 'save' your allocations, saving gas, too."

Our proposal is similar but more extensive. The first step would be to seek bids from computer firms to develop the card readers, gasoline rationing cards and necessary computer programs. A list of drivers and their addresses could be compiled from oil company charge account records. The

government must also take applications to ensure that all drivers receive a rationing card.

After testing the system to identify and correct problems, card readers would be manufactured and shipped to all gasoline stations. Gasoline rationing cards would also be mailed. A period of voluntary cooperation would phase in the system; presenting a rationing card would become mandatory once everyone had received one.

The process at the station would be similar to charge sales. The driver or attendant would insert the electronically encoded card into a card reader to display the individual's remaining ration. The driver or attendant would then pump up to this amount.

The kind and amount of gasoline

sold and its price would be encoded onto the card by punching a keyboard on the card reader. If the card readers were not functioning, a form would be used to record the sale. Gasoline deliveries would be recorded to make certain gasoline stations were enforcing the rationing system. Failure to record a gasoline sale would be a federal offense punishable by a large fine.

All transactions made on a card reader would be recorded on removable cassettes. At regular intervals, replacement cassettes would be mailed to all stations. The cassettes would be mailed back to the government for compilation of gasoline usage data.

An administrative apparatus would be needed to handle requests for ration alterations. Persons requesting a re-

duction in their ration would receive a cash bonus along with their new card. The bonus would be generated from charges made to individuals requesting a larger ration.

In addition, under a tax incentive plan, the 1040 form could be modified to include a gasoline use credit. Low consumption would be rewarded with a tax rebate inversely related to income.

Such a card-based rationing system has numerous advantages:

Administrative efficiency. This system would actually be a "standby" gasoline rationing system. In the event of an oil supply interruption, the card system could be reinstated immediately. A coupon rationing system would require a massive effort to redistribute coupons.

- Most of the rationing "work" would be done by computer, thus reducing the need for a large bureaucracy.

- Only one nationwide distribution of cards is required, instead of the continual distribution required with coupons.

- Coupons would be expensive. The nation's 165,000 gasoline stations pump an average of 50,000 gallons each per month. If gallon coupons cost one cent each to produce, the cost would be \$82 million per month, or nearly \$1 billion a year — not including the cost of distribution and collection.

- Card rationing allows the federal government to more precisely monitor gasoline allocation and usage.

- Allocation can be based on actual consumption. Data collected after the initial allocation may be adjusted on the basis of exact information.

Lessened fraud. Gasoline stations would be required to enforce the system. Stations might easily circumvent a coupon rationing system.

Moderation of gasoline prices. Rationing would limit demand, thereby creating less pressure on prices. In addition, the ability to electronically monitor prices would stem price gouging.

Energy conservation. The use of a tax credit is a direct incentive to reduce consumption. Such a system would not be possible without the consumption information afforded by the use of computers. As another conservation factor, distributing cards on the basis of drivers' licenses instead of automobile ownership eliminates the incentive to purchase automobiles.

The prospect of future gasoline shortages necessitates a plan for effective rationing. The imperatives of justice, equity and national security demand such action.

Enholm and Rueter are graduate students at the University of Wisconsin in the departments of economics and political science, respectively.

Get with the fast set:

FAQS®

The Fast Queuing System

More than 500 companies have found how valuable a tool FAQS is already, and the faster they get started with it, the faster they like this Datapro Honor Roll product.

FAQS features a combination of data processing aids that go to work instantly for the DOS/VS(E) user. Console I/O spooling and partition balancing are two of its most popular functions. The Console I/O spooling feature gives job related console messages with SYSLT output. Either program function keys or shortened replies may be substituted for text in common console replies. Also incorporated into FAQS is a full function partition balancer with four separate balancing algorithms to choose from.

FTL®

The Fast Transient Loader

Again, 500 happy users have joined the fast set with FTL. It now features multiple logical transient area support, spelling the end of the transient-area bottleneck for DOS/VS(E). And look at these features:

Any transient or self-relocating phase may be made resident in virtual or real storage.

One to 7 additional transient areas may be generated. Unshareable resources are automatically enqueued; the enqueue table may be changed by the user at any time. Plus, FTL offers full fetch and overlap statistics; a fetch/load monitor, and can be initialized or deactivated at any time.

FTL can be leased for \$50/month (no minimum lease period) or \$1620 for permanent license. And it's even less if you lease FAQS, too.

Join the fast set: send the coupon now.

**Yes:
I'm ready to
join the
fast set:**

SEND MORE INFORMATION

I'D LIKE A FREE TRIAL

PHONE ME NOW

Name _____ Title _____

Company _____

Address _____

Phone _____

Goal Systems Corp:  **The Goal-Getters.**
P.O. Box 29481/Columbus, OH 43229/(614)268-1775.





"Wow! He's hit MACE* again!"

*MANAGEMENT APPLICATIONS IN A COMPUTER ENVIRONMENT

\$100,000 combination jackpot

TWO COMPLETE LIBRARIES

OCTOBER COMPUTERWORLD

DP MANAGER A HERO?



WITH MACE*, YES!

*Management Applications in a Computer Environment

ONLY \$75,000

gives you a complete library of
MANUFACTURING SOFTWARE

including

ON-LINE DATA ENTRY AND INQUIRY
BILL OF MATERIALS ROUTING
INVENTORY MANAGEMENT
MATERIAL REQUIREMENTS PLANNING
PRODUCTION CONTROL
CAPACITY PLANNING

SHOP FLOOR CONTROL
PURCHASE ORDER CONTROL
ACCOUNTS PAYABLE
PRODUCT COST
PHYSICAL INVENTORY
FORECASTING

**You can't buy a comparable system
at any price... anywhere**

FIRST TIME OFFERED

Mid-America Computer Corporation utilizes MACE to service a network of national manufacturing companies and now you, too, can have the full library of applications for use by your data center.

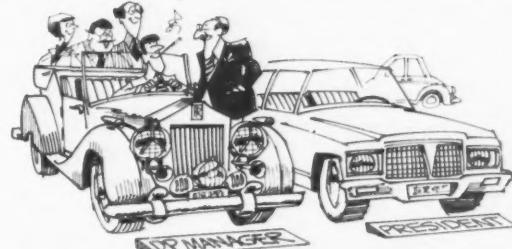
Call our TOLL-FREE number today 800 323-1733



MID-AMERICA COMPUTER CORPORATION

Mid-America Drive Thorndale at York Road Bensenville, IL 60106

NOVEMBER COMPUTERWORLD



"...and he said it was for finding MACE."

*Management Applications in a Computer Environment

only \$40,000

gives you a complete library of
DISTRIBUTION SOFTWARE

including

ON-LINE DATA ENTRY AND INQUIRY
ON-LINE ORDER ENTRY
ORDER PROCESSING
BACKLOG AND INVOICE PROCESSING
ACCOUNTS RECEIVABLE
INVENTORY MANAGEMENT

MASTER LOCATOR
PURCHASE ORDER CONTROL
ACCOUNTS PAYABLE
PHYSICAL INVENTORY
FORECASTING
SALES ANALYSIS

**You can't buy a comparable system
at any price... anywhere**

FIRST TIME OFFERED

Mid-America Computer Corporation utilizes MACE to service a network of national distribution companies and now you, too, can have the full library of applications for use by your data center.

Call our TOLL-FREE number today 800 323-1733
in ILLINOIS 800 942-0428



MID-AMERICA COMPUTER CORPORATION

Mid-America Drive Thorndale at York Road Bensenville, IL 60106

Soviets Making Military Use of U.S. DP Gear

(Continued from Page 19)

ogy, experts believe, is their failure to master "chip" technology, the ability to place large numbers of miniature components on tiny silicon chips about half a square inch in size. American engineering can put up to 50,000 components on a chip, while the Soviets can barely manage 2,000.

Moscow has been trying to overcome this technological backwardness by buying and stealing Western technology. In 1972, with U.S. approval, France agreed to build an integrated circuit plant in Poland. In a related deal, a U.S. firm contracted with another Soviet bloc country to develop a turnkey production line of integrated circuits for hand calculators. Included in the agreement was a provision to

provide them with all new technological advances for the next five years.

J. Fred Bucy, president of Texas Instruments, Inc., is convinced that the "transfer of militarily significant technology has been of major proportions," and that the Soviets have narrowed the gap in military capability as a result. Bucy, a renowned physicist, notes that the seemingly harmless digital watch and hand calculator embody a technology with tremendous military potential.

Sen. Henry Jackson [D-Wash.] revealed that with minor changes such plants could be modified to produce "almost the entire range of circuits for military applications." Integrated circuits, one must remember, were developed by the U.S. Air Force for its Min-

uteman missile program.

The May 1978 issue of *Electronics Warfare-Defense Electronics* magazine reported the presence of at least 50 Soviet spies in the electronics industry's so-called "Silicon Gulch" south of San Francisco. These spies make a daily report of the latest semiconductor data to Russia via a Soviet satellite that passes overhead.

The computational speed and memory capacity of each side's computer systems are as important in the strategic balance as the range and megatonnage of its missiles. All the new technologies — avionics, gyros, lasers, metallurgy, nucleonics, propulsion systems and even computer design itself — are dependent on computers.

We have sold IBM 360 and 370 series

computers to the Soviet bloc. An IBM 360/65 was absolutely essential to the success of our manned lunar landing program.

As former top Pentagon and National Aeronautics and Space Administration (NASA) official Robert C. Seamans Jr. has pointed out: "The computer that's used in computation for lunar flights can also be important in a number of other strategic areas — all the way from air defense to deployment of strategic forces, tactical aircraft and ground forces. It's invaluable in gathering large amounts of data, assessing what's going on, redeploying and sending out the necessary commands."

Military Advances

Rep. Ben Blackburn of Georgia states: "We know that U.S. and British computer technology has enabled the Soviet leaders to advance development of their feared Mirvs from two to four years." During 1973 tests, Soviet boosters carried on-board computers for the first time, computers based on Western technology. Such computers are vital to Mirv accuracy, and the more advanced models the Soviets have, the more accurate the warheads become, and the more vulnerable our Minuteman/Titan force becomes.

On Sept. 30, 1976, the sale of a Control Data Corp. Cyber 73 system to the Soviet Union was approved despite Pentagon and Energy Research and Development Administration objections that it was suitable for nuclear weapons calculations, for antisubmarine warfare (ASW), for large phased-array radar to track intercontinental ballistic missiles (ICBM) and other military applications.

A system to kill deeply submerged submarines needs exact real-time oceanographic data and calls for computers the Soviets are incapable of building themselves. An ASW system must be permeated with computers: to build the ships and the weapons; to assure weapon reliability and accuracy; to navigate; to operate the sensors, integrate their signals and enhance their data; to determine hydrological conditions; to communicate; and to fight.

Only as we have provided the USSR with our technology have they been able to track and threaten our Polaris and Poseidon submarines.

Space does not permit the listing of military uses to which we put our so-called "business" computers, uses to which the Soviets can also and have also put them, uses which were formerly beyond their capabilities.

Profit Motive

It was the desire to improve the profit-and-loss statement that convinced some American industrialists 40 years ago to sell to Imperial Japan the scrap metal which Admiral Yamamoto was kind enough to return to us at Pearl Harbor. Today, the same profit motive is propelling Western businessmen to compete to fill, post-haste, the lucrative orders for machinery, manufactured goods and technology of the Soviet military-industrial complex.

Peace brings trade. Trade does not bring peace. Those who refuse to learn from history are condemned to repeat it.

Sobieski is a senior systems analyst with Associated Mills, Inc. in Chicago.

Small Business Systems Surveyed Microdata Reality Gets Top User Rating

Microdata Corp.'s Reality, Basic/Four Corp.'s Model 400 and the IBM System/3 models 6, 10 and 15 reaped the highest marks in Management Information Corp.'s (MIC) fourth annual small business systems users survey.

To assess how well small business systems are meeting users' needs, MIC polled 568 companies that use 689 small business CPUs.

Each respondent was asked to subjectively rate the vendors and their products on performance (whether stated equipment specifications have been realized), reliability (uptime vs. downtime), ease of use (amount of time necessary to train new personnel), service (maintenance) and vendor support (such as advance training and program assistance).

A four-point rating scheme was used (1 = poor, 2 = fair, 3 = good, 4 = excellent). The survey results were given as averages of the ratings assigned to each product in each of the five categories.

The Microdata Reality, Basic/Four 400 and System/3 Model 10 and Model 15 were the only small business systems to receive ratings of 3.0 or higher in all five categories.

Taking the average of all five categories, the Microdata Reality topped the field with

a score of 3.66 (based on 27 respondents using 55 units). The Reality earned 3.4 in performance, 3.8 in reliability, 4.0 in ease of use, 3.4 in service and 3.3 in support.

Based on nine respondents with nine units, the average for the IBM System/3 Model 15 was 3.6. This system was rated 3.6, 3.8, 3.6, 3.7 and 3.3 in performance, reliability, ease of use, service and support, respectively.

Eight users with 17 Basic/Four 400's gave that system an overall rating of 3.5. In performance, reliability, ease of use, service and support, the system was rated 3.5, 3.4, 3.8, 3.4 and 3.4.

Following this order, the IBM System/3 Model 10 was

rated 3.3, 3.5, 3.3, 3.3, and 3.3, respectively, by 34 users with 45 units. The System/3 Model 6 received 3.4, 3.7, 3.7 and 3.1 ratings in performance, reliability, service and support, respectively, by eight users with eight units.

Copyright © 1979,
CW Communications/Inc.,
Newton, MASS 02160

In Case You Missed It, OUR COMPETITORS JUST CAME FACE TO FACE WITH REALITY.®

A recent MIC survey published in Computerworld asked small business computer system users to evaluate their equipment.

The result: our competitors lost. They lost in performance. They lost in ease of use. They lost in overall user satisfaction.

If you don't want to make the same mistake our competitors' users made, face Reality. Call your nearest authorized Microdata representative.

Microdata Corporation
Direct Sales Offices:
Atlanta 404/266-8900
Chicago 312/981-1440
Cleveland 216/234-7318
Los Angeles 714/540-6730
Miami 305/592-0770
New Jersey 201/964-6700
New York 212/695-6509
San Francisco 415/697-0430

Authorized
Microdata Dealers:
Anchorage 907/276-2431
Anchorage 907/276-2431
Bremerton 604/438-7361
Boise 208/345-3560
Boston 617/273-2920
Dallas 214/243-6350
Denver 303/773-1510
Detroit 313/358-1950
Edmonton 403/487-0871
El Paso 915/772-8126
Fayetteville 501/756-0970
Houston 713/440-6111
Honolulu 808/521-8011
Indianapolis 317/257-1426
Kansas City 816/483-6900

Los Angeles 213/685-8910
Memphis 901/346-0088
Monroe 318/325-9618
Montreal 416/862-0125
Nashville 615/373-3636
Oakland 415/547-6565
Philadelphia 609/779-1901
Portland 503/245-7714
Puerto Rico 809/844-3020
Raleigh 919/782-6020
Salt Lake City 801/531-1122
St. Louis 314/993-1000
Spokane 509/624-1308
Toronto 416/862-0125
Washington, DC 703/549-4300

Reality by Microdata

Recommends Five Packages to States Labor Grants Funds for Report Systems

By Don Leavitt

CW Staff

WASHINGTON, D.C. — In what may be a precedent-setting move, the U.S. Department of Labor has evaluated a number of reporting systems and then granted funds to various state employment security agencies so they could acquire any one of the five recommended systems for their own use.

Although all states were eligible for the grants, only 43 have applied for and received them: the other states presumably are satisfied with whatever reporting system they already have.

The recommended package list included Mark IV from Informatics, Inc. and Easytrieve, the retrieval system from Pansophic Systems, Inc. as well as three other products. Thirteen of the states getting grants chose Easytrieve.

Justification for the evaluation effort and funding was easy, according to Labor officials. While federal employment reporting requirements were successfully being met each month with a Cobol-based facility called the Employment Security Automated Reporting System (Esars), researchers at the department discovered two years ago that the states were not using it extensively for their own internal reporting.

"Esars is a very large system and the states were finding it took lots of CPU time, lots of disk and tape storage and used lots of paper," Terry Wiram of Labor's system division explained. "While the federal re-

ports contain an incredible amount of information, the states were extracting only bits and pieces for their own use.

"Often the information they needed wasn't even in one of the standard Esars reports, so they were forced to write new programs to create the output they needed. With fixed DP staffs and heavy work loads, response to requests for ad-hoc reports was painfully slow."

Search for Package

Wiram's group had become aware of the trend toward using packaged software and decided the states needed a comprehensive package for their own use. The states needed a system that was flexible enough for even the most nontechnical person to use, and the group decided it should come from a vendor who would give strong support and enhance the product to keep it up with the state of the art.

"The more we thought about this idea, the more we realized we should take the initiative and act as a clearinghouse for all the state agencies. Through mass acquisitions, we could save money and by doing the background investigations, studies, testing and reports, we could save each state the expense, time and headaches of such a large-scale search," Wiram continued.

The study began in 1977: Wiram was familiar with specific application packages but he knew the states really needed a broad information retrieval or data management system. For several months, he studied various software directories, including those from ICP, Datapro Research, Inc., Auerbach Publishers, Inc., the National Technical Information Service (NTIS), and also the Federal Software Exchange Catalog.

The study group found almost 125 packages that seemed able to

present data in some logical manner, "so we sent a detailed five-page questionnaire to the vendors and asked them to reply. We received 50 responses."

From these 50 responses, Wiram selected less than 10 packages he wanted to test. But first he wanted to talk to current users, so he began tracking down several for each of his selections. "These weren't all vendor-supplied references," Wiram said, "so I felt I was likely to get honest responses."

Nine Test Sites

A year after Wiram began his search, six different report writers designed for IBM computers and three packages for non-IBM machines were each installed in a different state employment agency for testing. With installation, on-site training and support provided by each vendor, Wiram could con-

(Continued on Page 30)

Finite Element Program Works In Two-Dimensional Regions

HOUSTON — International Mathematical & Statistical Libraries, Inc. (IMSL) has introduced the Two-Dimensional Elliptic, Parabolic and Eigenvalue Problems (Twodepep) software, which a spokesman said is a small, easy-to-use finite element program.

Twodepep solves a large class of applications-oriented, time-dependent, steady-state and

eigenvalue problems in general two-dimensional regions, the spokesman explained, adding that a preprocessor and an automatic mesh refinement and grading system help it to minimize user effort in solving "quite general partial differential equation problems."

Twodepep also includes support for auxiliary storage management, making possible the so-

lution of large problems. The package reportedly solves high nonlinear problems and handles general regions including those with holes or curved boundaries.

Time-dependent or steady-state diffusion problems with one or two components — or even more with somewhat greater user effort — can also be solved by Twodepep, he continued.

Summing up, he said anyone who requires solutions to problems involving elasticity, diffusion, heat conduction, potential energy, Schroedinger equations, Navier-Stokes fluid flows or minimal surfaces will find Twodepep a "cost-effective addition to their system."

The package can be acquired under lease for \$1,500/year, with discounts available for multiyear leases and a "substantial discount" to degree-granting educational institutions. IMSL is on the sixth floor of the GNB Building at 7500 Bellaire Blvd., Houston, Texas 77036.

'Docu-Text' Repriced, Enhanced

SAN JOSE, Calif. — Diversified Data Systems, Inc. has chopped the price of its OS-oriented Docu/Text documentation system and enhanced the capabilities of the OS/VS-oriented version of the software.

The package utilizes unmodified execution JCL streams as input and from that generates and maintains what a spokesman described as a comprehensive set of systems-level documentation.

The resulting reports can be used for tracking such things as data set accesses and peripheral usage, he said.

The cost of the OS-based package has been reduced 46% and is now \$1,200/year under a lease plan with maintenance. The perpetual license fee is still \$7,500.

Release 3.25 of Docu/Text provides OS/VS users with extended IMS support and a new commenting capability. High-

lighted in the IMS area is the ability to derive program names to be executed from PARM fields.

The comment facility provides a means of easily redocumenting an old system, he continued, remarking that this is useful in conversions where existing JCL is used in the new setting.

Diversified Data Systems is at Suite 205, 996 Minnesota Ave., San Jose, Calif. 95125.

**OVER 750 CUSTOMERS
WORLDWIDE ARE USING
TCSC PRODUCTS.
SHOULDN'T YOU
FIND OUT WHY?**



EDOS

Chicago, Illinois • Cleveland, Ohio • Dallas, Texas • Minneapolis, Minnesota • Los Angeles, California
Toronto, Canada • Paris, France • Grenchen, Switzerland • Stockholm, Sweden • Sydney, Australia • Mexico City, Mexico • Tel-Aviv, Israel • Caracas, Venezuela

THE COMPUTER SOFTWARE COMPANY

6517 Everglades Drive, Richmond, Virginia 23225, Telephone: 804/276-9200,
Telex: 828394

Please send information on the following TCSC products:
 EDOS Increases performance and operational facilities for DOS
 EDOS/VS-360 Enhanced DOS/VS for 360 user
 EDOS/VS-370 Advanced performance and operational capabilities for DOS/VS
 ECON Console management capabilities never before available
 EDOS/DATACOM/DB A direct approach to Data Base Management
 EDOS/DATACOM/A A centralized facility for data organization and control
 PDMS The complete program development and maintenance system
 DEX On-line Data Entry Control Systems

Name

Title

Company

CPU

Street

State

City

Zip

Phone

PRODUCTS FOR PERFORMANCE

CICS Users Offered On-Line Development Aid

NORWALK, Conn. — An on-line program development tool for IBM-based installations working with CICS, the CICS/MM package from Turnkey Systems, Inc. (TSI) eliminates the message management portions of the user's on-line programs, including all message "mapping" and

most data editing.

By handling much of the "mechanics" of getting the work on-line, the package enables the programmer to concentrate far more effort on the application logic. This shortens the development cycle and that, in turn, provides several benefits, a spokesman

said.

Display formats for both input and output are created interactively. No programming knowledge is required to create and test new formats: as a result, users without DP experience can participate in designing their interface to a new system even before any programming is done, the spokesman continued.

In addition to eliminating CICS "mapping," CICS/MM reportedly eliminates still more on-line programming by predicting all incoming data. Input edit rules, including arithmetic and table-lookup operations, are specified as the formats are created.

Since new formats can be tested immediately, formats and data editing criteria can be entered, tested and — if

necessary — revised in minutes, "ensuring user satisfaction with the final result before the first line of code is written," according to the spokesman.

CICS/MM makes no modification to either CICS or the operating system, requires less than 40K bytes of virtual or real storage, runs under any IBM operating system and can be implemented on any hardware system that includes IBM 3270-compatible devices, the spokesman reported.

The package costs \$14,000 or \$390/mo on the 36-month or longer lease. Discounts of 20% are available to qualified educational institutions even on the first installation; other purchasers are offered discounts for multiple acquisitions.

TSI is at 50 Washington St., Norwalk, Conn. 06854.

Pascal Style Guide Debuts

ROCHELLE PARK, N.J. — A 224-page style guide, specifically intended for Pascal programmers who want to write carefully constructed, readable programs, has just been published by Hayden Book Co., Inc. Entitled *Pascal With Style: Programming Proverbs*, it was written by

Henry F. Ledgard, John F. Huertas and Paul Nagin, a spokesman said.

The book offers guidelines that stress overall program organization and logical thinking. A chapter on the top-down approach is included in this \$6.95 book, he added from 50 Essex St., Rochelle Park, N.J. 07622.

Using Power/VS? Then you Need

SERCON'S™

THE POWER/VS QUEUE STRIPPER And THE POWER/VS QUEUE LOADER

STRIPPER™

STRIPPER FEATURES

- Print, punch, & reader job selection from Power/VS Queues
- Selection by jobname, jobname prefix, forms, and/or class of jobs in hold state or leave state
- Output tape Power/VS compatible
- User exit for other output format tapes
- No modifications to Power/VS
- Selection report indicating jobs selected
- Keyword = Parameter control cards
- Elimination of multiple tape drives for tape spooling under Power/VS
- Sysin tape supplied for easy installation
- Card reader or console execution
- Concurrent operation with Power/VS or when Power/VS is inactive
- Transfer of Power/VS jobs from one CPU to another CPU
- Automatic releasing or deletion of selected jobs
- Support for IBM DOS/VS release 31 0 up

STRIPPER USES

- Production of host formatted computer output microfilm tapes without modifying application programs
- Production of offline print tapes
- Supporting non-standard IBM devices for Power/VS output
- Backup of reports
- Removing Power/VS "Full Queues" by temporary tape storage
- Creating punch interpret for jobs in the Power/VS punch queue
- Production of Power/VS tapes for office microfilm production
- Producing tapes for the Power/VS Queue Loader for subsequent loading to Power/VS
- Backup of large reader jobs in the event of Abends to avoid reloading
- Backup of RJE Reader jobs in the event of Abends to avoid reloading since RJE station operators may not be available

LOADER™

LOADER FEATURES

- Print, punch, & reader job loading into Power/VS Queues from a Power/VS tape
- Selection by jobname, jobname prefix, forms and/or class
- Input tape Power/VS compatible format
- User exit for other output format tapes
- No modifications to Power/VS
- Selection report of jobs loaded to Power/VS
- Keyword = Parameter control cards
- Sysin tape supplied for easy installation
- Card reader or console execution
- Concurrent operation with Power/VS or when Power/VS is inactive
- Automatic releasing or holding of jobs loaded to Power/VS
- Support of DOS/VS 31 0 up

LOADER USES

- Retrieving jobs that were backed up by the Power/VS Queue Stripper for Power/VS processing
- Reloading of jobs for multiple transmission to RJE terminals
- Reloading of jobs that were retrieved for backup or "Full Queue" conditions
- Transferring Power/VS jobs from one CPU to another that are not sharing Queues
- Printing of selected report pages without printing an entire report

★ PRICING (MAINTENANCE INCLUDED)

ONE YEAR LEASE - STRIPPER	\$ 750.00
ONE YEAR LEASE - LOADER	\$ 750.00
ONE YEAR LEASE - BOTH	\$1000.00

★ NO CHARGE ON SECOND CPU SAME SITE

★ FREE TRIAL - 30 DAYS

★ OVER 100 USERS



4611 NORTH LINDHURST
DALLAS, TEXAS 75229
(214) 691-3020

Labor Assesses Report Systems

(Continued from Page 29)

centrate on developing a comprehensive testing program. The result was a series of 13 reports to be developed and produced by each test site using a common test tape.

Wiram and his team were looking for:

- The ability to access variable-length files and records.
- The ability to access multiple record types within the same file.
- The ability to generate multiple reports with a single pass of a file.
- The ability to produce single or multiple reports from multiple files.

"We had a lot of table look-up in our benchmark and cross tabulations, selects on computed variables as well as data elements and conversion of data to descriptors. We wanted to edit out invalid numeric data as well as compute variables not in input data," Wiram explained.

"We validated the test results and asked each site for specific information such as estimated man-hours used to develop the reports, DP background of the programmer, copies of the report and the code written to run the test. Then we asked each agency to write an evaluation of its test package. The testing took about nine months and the results were compiled into a 282-page report," he said.

"In a very competitive situation, the Easytrieve site turned in some very impressive test results," he said. "For example, one of our test tapes contained more than 60,000 records, and the state agencies were asked to create a fairly complex summary report taking totals on control breaks with selection criteria and computations.

"I've had 13 years of Cobol experience and it took me three hours and five minutes to analyze, code and debug the benchmark program using Cobol. A systems analyst with less than three months' Easytrieve experience produced an identical report in one hour. And, compared to what I had thought was a compact 120-statement Cobol program, his Easytrieve program was complete with 32 English-like statements," Wiram stated.

As soon as installation in all the states is completed, Wiram will begin a follow-up project to see how the states like their new retrieval system.



Score V, the programmers productivity tool of the '80's

INCREASE YOUR PROGRAMMERS PRODUCTIVITY

Reduce conventional program development costs dramatically.

Are you limiting your programmers productivity with tedium? Is the creativity so essential to effective programming being stifled by time consuming, repetitive detail work? Are you honestly making maximum use of your costly program development resources?

Score V has the answers to these common program development questions. Score V is an enhancement of an exceptional software product currently operating in over 400 installations. For years the major thrust of software development has been to benefit end users. Now comes Score V software to substantially improve programmer efficiency. If you have responsibility for effectively managing people resources - you need Score V.

Very simply Score V is a COBOL program generator with the ability to define functional requirements in simple English. It is particularly valuable to computer facilities

operating on tight time schedules and burdened with many "special requests". Score V enhances the capability of the COBOL programming shop by reducing time schedules and the costs of most implementation demands.

Immediate improvements in programming efficiency include: reduced coding time, reduced debugging time, simplified maintenance, compatibility with other hardware and programming standardization. Score V is easily cost justifiable as a program development tool with equal value as a vehicle to meet critical "ad hoc" management requests. For the rest of the

story call or write for your copy of "How to increase your programmers productivity".

Score V is available on most major computer systems through Software Design Associates, a leader in the supplying of software and professional services with an 11 year history of providing information processing assistance to over 300 Fortune 500 companies. Offices worldwide.



Read our booklet "How to increase your programmers productivity".

Call or write

212-481-6800

SDA Products, Inc.
475 Park Avenue South, New York, NY 10016

SDA
SOFTWARE DESIGN ASSOCIATES

Interactive DBMS Unveiled For PDP-11s Under RSTS/E

PALO ALTO, Calif. — Intac, an interactive data base management system (DBMS) that operates on Digital Equipment Corp. PDP-11s running under RSTS/E, is now available from Ross Systems, Inc.

The system provides a conversational method to establish data bases; to add, change and delete data; and to perform inquiries, generate reports and modify data file definitions. It also includes a set of create and access subroutines.

Intac's interactive query language was designed for use by non-DP-oriented as well as technically trained personnel. Ross' package includes a report program generator that uses English-like specifications to set the

contents and form of any output.

Written in Basic Plus II and supporting multikey Isam files, comprehensive edit rules, multiple file access for reports and extensive programming functions, Intac costs \$20,000.

The package can be ordered from Suite 208, 1900 Embaradero Road, Palo Alto, Calif. 94303.

'Datamanager' Tied to IMS/DC

LEXINGTON, Mass. — MSP, Inc. has announced an extra-cost option that allows its Datamanager data dictionary to interface with IBM's IMS/DC facility. Previous interfaces support linkages with IBM's CICS and Applied Data Research, Inc.'s Roscoe.

The interface includes preformatted CRT screens designed to simplify the entry of definitions and

commands to the system. Screen selection is by program function key.

Running under IMS/DC as a normal user program, Datamanager can share regions with IMS programs and its data sets can be held in common with TSO and IMS/DC. The IMS/DC interface is available as a selectable unit for \$3,000.

MSP is at 21 Worthen Road, Lexington, Mass. 02173.

Utility Lets System/34 Users Check Output

ASHLAND, Mo. — Users of IBM System/34 small business systems have the opportunity to review various forms of normally printed output at a CRT screen on a workstation by in-

stalling the Spool View Utility (SVU), according to the vendor, CFS Industries, Inc.

SVU enables users to display the status of the print queue, display and re-

view printed output or save the electronic version of printed output on disk or diskette for later review or printing.

To illustrate the significance of this software, the vendor said programmers could save both money and time by reviewing compilation listings and identifying errors even before the listings are printed. End users could save the images of customer statements for retrieval on the screen in case of any queries about items.

By providing a command language, the utility allows the operator to select a report, to page forward or backward through it or to identify a specific page for review.

SVU supports rolling up and down as well as left and right on a page, and users can start the display at any specified column so they can see the desired portion of what was designed as a 132-column page on an 80-column CRT screen, a spokesman said.

To use SVU, a site must have a System/34 CPU and an IBM 5251, Model 11 or 12, workstation. The utility costs \$375, the spokesman said from Rt. 1, Ashland, Mo. 65010.

Package Replaces Isam and Vsam

CLIFTON, N.J. — CPU time for Vsam- or Isam-based batch work can be cut 20% to 40% while disk EXCPs and wall-clock time are usually cut in half in IBM-oriented centers using Version 4.0 of the Innovation Access Method (IAM) software, according to the vendor, Innovation Data Processing, Inc.

Redesigned to be a "drop-in replacement" or transparent alternative to IBM's access methods, IAM Version 4.0 is also said to provide better performance than earlier versions, which required application program changes.

Batch and On-Line

IAM is intended for use in both batch and on-line environments. The Isam transparency feature supports all languages under both OS and OS/VS, and specific on-line interfaces are available to put the software features under any of various teleprocessing monitors.

The interfaces are ready now for CICS from IBM, Intercomm — now from Software Design Associates, Inc. — and Task/Master from Turnkey Systems, Inc. A generalized on-line interface is also available.

The updated IAM, including transparency and the on-line interfaces, costs \$10,000 for the first year, the spokesman said from 970 Clifton Ave., Clifton, N.J. 07013.

CICS/MM

A whole new approach to CICS programming.

Programming a CICS application will never be the same. CICS/MM eliminates as much as 50% of the code in an on-line program and greatly simplifies all application development. In addition, the resulting programs are smaller, use less resources, run faster, and are easier to maintain.

Interactive design.

CICS/MM puts an end to "mapping". Display formats are designed and tested right at the terminal. Data editing is specified on-line and is performed automatically before the application program gets control. All the programmer adds are the instructions which manipulate the data.

The benefits of CICS/MM go far beyond reduced programming costs. Users get involved early in the design process.

Formats are fully tested before programming starts. Applications are standardized and self-documenting. Control of formats and editing criteria is centralized. Application maintenance costs are minimized.

Easy to install.

CICS/MM can be installed and ready for use in minutes. It works with both CICS and CICS/VS and runs under any operating system. All you need is 36K of virtual or real storage and one or more local or remote 3270 (or compatible) terminals.

No risk 30-day trial!

We'd be glad to tell you more, give you a demo, or sign you up for a 30-day trial at no risk to you. Just clip the coupon or call.

We're interested in CICS/MM.

- Send a brochure.
- We'd like a demo.
- Schedule us for a 30-day trial.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____



Turnkey Systems Inc.
50 Washington Street
Norwalk, Connecticut 06854
(203) 853-2884/Telex 964351

2814 New Spring Road
Emerson Center, Suite 300
Atlanta, Georgia 30339
(404) 432-2149

Lombard Office Park
2200 South Main Street
Lombard, Illinois 60148
(312) 629-6404

Additional Representation Worldwide

21711 West Ten Mile Road
Suite 105
Southfield, Michigan 48075
(313) 353-7430

59 North Santa Cruz
Suite P
Los Gatos, California 95030
(408) 395-6600

12606 Greenville Avenue
Suite 244
Dallas, Texas 75243
(214) 386-8604

TSI International Limited
Park House
22 Park Street
Croydon, Surrey
CRO 1YE, England
01-680-7778



"NCR's VRX has cut our run time by 36 percent," says Yasuhiko Okiyama of Sumitomo Bank.

OKIYAMA:

Sumitomo's sudden growth — from \$900 million to \$1.3 billion in a single year — has caused us to upgrade our EDP system. We are moving from an NCR Century 300 to two NCR V-8580's. And moving smoothly despite the pressure of increasing volume.

NCR's BOB SULLIVAN:

VRX (NCR's Virtual Resource Executive) is making a substantial contribution to increased productivity.

OKIYAMA:

We are using VRX to run our batch operations. VRX has cut our run time for these programs by 36 percent.

SULLIVAN:

Your online experience has been impressive, too.

OKIYAMA:

We have seen a 15.4 percent improvement in the handling of online transactions due entirely to the new generation hardware. And we know there will be another impressive jump in efficiency when VRX takes over the online operations. Under VRX, error recovery takes just seconds. With the old system, we needed a full minute.

SULLIVAN:

VRX offers full dynamic resource allocation and



Yasuhiko Okiyama (left) is Vice President and Manager, Sumitomo Bank of California, San Francisco, the 92nd largest bank in the U.S. Bob Sullivan is an NCR district manager.

virtual memory with no rigid memory partitioning. You can run up to 35 jobs simultaneously. And Sumitomo will soon be using Online Program Development (OLPD), a feature of VRX that multiplies the effectiveness of a programming group.

OKIYAMA:

Still, the most significant point I can make about this move from the last generation of NCR equipment to the next is that our old programs continue to run. We are making the transition easily because none of our software has become obsolete as a result of the change in hardware.

SULLIVAN:

That's NCR's Migration Path Engineering. One of

our primary objectives is to provide easy alternatives for our users as the demands on their systems change. To eliminate dead ends. So that every user can upgrade gradually as his volume grows.

In the NCR office near you, there is an NCR account manager like Bob Sullivan who knows your industry and knows NCR systems, including VRX. To learn more about what an NCR system can do for you, phone him at your local NCR office. Or write to EDP Systems, NCR Corporation, Dayton, Ohio 45401.

NCR
Complete Computer Systems



Data Dictionary Can Impact Every Department

By Mike Hicks

Special to CW

Data is becoming an increasingly important corporate resource and must be controlled as carefully as any other major resource. One way for management to gain this control is to centralize all descriptive information about data in a data dictionary.

Implementation of a data dictionary can positively impact every department in a corporation, although the degree to which benefits are realized depends on the degree to which the dictionary is used.

A data dictionary can provide a wide range of benefits to every area — management, auditing, data base administration, programming and analysis, operations and the end users of DP services as well.

Management Control

Management most readily realizes dictionary benefits through improved control and communications in all levels of corporate activity. By enforcing standards and centralizing collection, control and use of all necessary definitions in the DP environment, a dictionary can offer quick access to information needed for top-level decision making and coordination.

A data dictionary system can also reduce labor-intensive activities by simplifying and automating many repetitive, error-prone tasks and procedures. In addition, the volume of data to be managed can be reduced by eliminating data redundancies. This helps to maximize productivity of both human and machine resources.

Since a data dictionary is the single source for all information and documentation about the entire DP environment, auditors have an effective, centralized mechanism for tracing the flow of data, functions and dollars throughout the corporation.

A dictionary's on-line documentation, cross-referencing and reporting capabilities allow audit personnel to evaluate and report easily on corporate, departmental and individual responsibilities. This increased accuracy in determining accountability can help set corporate direction by improving user communication and confidence.

DBA Assistance

A dictionary is invaluable in assisting data base administrators (DBA) with design, servicing and control of the corporate data pool. It simplifies the process of defining data and relationships by providing a quick, accurate means for building and verifying data base structures in a fully documented on-line mode. Cross-reference and inquiry capabilities permit assessment of the impact of change well before the actual change is implemented.

By eliminating unwanted data redundancies, hardware resources can be conserved through reduction of data base space requirements. Use of a data dictionary will minimize many of the errors associated with the DBA function by:

- Giving control and document information;
- Providing examination of data redundancy and control of future data redundancy;
- Providing accurate data definitions to be included in programs;
- Controlling the availability of sen-

sitive data to particular users;

- Controlling test and production definitions of programs;
- Ensuring that management objectives are obtained.

Since a dictionary provides automatic standards for enforcement, the DBA is assured of data uniformity and usability. A dictionary also aids in troubleshooting production activity by providing easily reportable structure information. Security is enhanced by controlling the access to definitions and dictionary functions.

A data dictionary should be the single source for all data base management system (DBMS) information. When this is true, system software personnel can use the dictionary to simplify maintenance and enhance the reliabil-

ity of the DBMS.

In addition to using a dictionary as the central source for all application data definitions, application analysts and programmers can use a dictionary as an effective design and development aid.

Application design activity is accomplished more quickly and accurately through on-line access, and new application development time is reduced when dictionary definitions are used to automatically and correctly generate (in desired programming language formats) control blocks and program input/output areas.

Operations Benefits

The DP operations function benefits from a dictionary in several ways. Use

of a dictionary helps avoid production failures and speeds problem resolution, human error is reduced, and access security is improved. Inquiry and reporting facilities assist in operations problem-solving by showing the troubled area and determining responsibility.

Finally, end users benefit from the improved communications and responsiveness provided by a data dictionary. Communications improve not only between the users and the DP organization, but also between the users in various functions throughout the corporation.

Hicks is product manager for the UCC Ten data dictionary/manager software package at University Computing Co. in Dallas.

A year's experience has proved us right about Series 80 TOTAL. It's the easiest software package to learn and use... and improves programmer productivity.

George F. England
Information Services Manager
Imperial Tobacco Ltd.
American Leaf Organization

Imperial Group Ltd., a diversified manufacturer of consumer goods, is one of the U.K.'s largest companies.

Pondering Possibilities — Part 2

Despite Problems, Pascal Called a Good Choice

By Russ Artzt

Special to CW

When Computer Associates decided to update CA-Earl, we examined PL/370 and Pascal in considerable detail. Sample programs were produced with each, and the ease of writing and the efficiency of the generated code were compared.

Pascal contributed to far higher programmer productivity — at least four times higher than assembler. PL/370, on the other hand, seemed more related to IBM's Basic Assembler Language (BAL), with a minimum of reasonable transportability.

Further investigation of Pascal revealed the following:

In this article, the second in a two-part series, the author — a vice-president of Computer Associates in Jericho, N.Y. — explains why Pascal was chosen as the language to be used in rewriting one of his company's packages. In last week's article, he explained why other languages were not chosen.

• Pascal provides a significant amount of logic testing during the compile phase. For example, defined

fields and addresses can be assigned range values that the Pascal system uses for validity checking.

As a result, about the time the compiler is generating "error-free" code, the testing process has reached a more advanced stage. In addition, there is a "runtime checker" which speeds up the testing process.

- Compared with assembler, Pascal requires less source code generation by a factor of at least 10.

- With the help of the U.S.-based Pascal User's Group, all known available Pascal compilers for IBM 360s and 370s were evaluated. Versions of the compiler we chose run under batch OS and under VM/370's Conversational

Monitor System (CMS).

VM/CMS is the main operating environment in our own 370-based development centers, although we also use Idos/VS, which is our interactive alternative to IBM's DOS/VS. With some additional work, the compiler was adapted for DOS application as well.

- During our feasibility study, it was decided that a top-down design should be used to permit analysis of the packages input syntax. This modular approach forces the use of only one routine within the package to perform any one function. This leads to a significant reduction in size.

As a result, package stability and ease of package maintenance would be greatly improved. New facilities could be added without the risk of affecting previously tested code in existing routines. We found Pascal to be ideally suited to this approach.

- The Pascal compiler we used (from the Stanford Linear Accelerator Center) allows executable code to be produced either directly from the compilation — or from the source-level assembler code. This latter option was felt to be particularly appropriate to the project.

Once the package was developed and released, the normal assembler-level maintenance offered by our worldwide regional support centers could incorporate support of the new CA-Earl without extensive training in Pascal.

Because of the "interpretive" nature of the Pascal compiler and the similar concept it forced on the designers of the new CA-Earl, we found the generated code to be somewhat less efficient when compared with assembler. However, we felt that the more flexible approach to design possible with Pascal and the improved facilities of the new version more than made up for this potentially slight degradation of performance.

Results of the Study

The CA feasibility study group completed its work in March 1978, and its recommendations to go ahead with an entire rewrite of the package using Pascal were accepted. Use of Pascal allowed us to:

- Develop the new version of CA-Earl within the time frame specified.
- Meet almost all of the programming requirements.
- Maintain compatibility with previous versions.

(Continued on Page 36)

tolas II ... For Commercial PDP-11 RSTS/E Systems

The Transcomm On-Line Accounting System — Comprehensive application products for Distribution Control & Financial Management. An ICP Million Dollar Award winning software package, from

transcomm

The world's first commercial RSTS/E Timesharing Center.

Take the time to compare. You'll see why discriminating companies have selected TOLAS-II over competing systems.

TRANSCOMM DATA SYSTEMS

1380 Old Freeport Road

Pittsburgh, PA 15238 • (412) 963-6770

AUTHORIZED **DIGITAL** COMPUTER DISTRIBUTOR



Cincom Systems, Inc.
Systems Software Division

SERIES 80 TOTAL. BECAUSE YOU ONLY LOOK AS GOOD AS YOUR DATA BASE SYSTEM.

Just about every DBMS is built with the technician in mind.

Unfortunately, not many systems consider the Data Processing executive's needs. Such as, integrating the data base system into the company's system of management; applying the DBMS to produce the right information as quickly and as understandably as possible; and, most important, minimizing overall investment — in machine resources, programming time and manpower.

Series 80 TOTAL is unique because it satisfies the technician's DBMS requirements and management's needs as well.

That's because Series 80 TOTAL is built not just for why you buy a DBMS, but also for how you use it.

THE MOST USEFUL SYSTEM IS THE ONE THAT'S USED MOST.

It stands to reason that the more useful a DBMS is to management, the more they'll use it. A survey of data base users by International Data Corporation (IDC), the independent research company shows that TOTAL users integrated TOTAL into an average of 41% of all user applications.

That's more use than any other DBMS, and almost twice as much as the next leading system.

Series 80 TOTAL is used more because it's the only data base management system structured to mirror your company's system of management. So it makes sense to end users as well as Data Processing executives. And, as business needs change, Series 80

TOTAL's modular, step by step development capabilities are flexible enough to be adapted to change, quickly and inexpensively.

You can add new data, new functions, new applications modularly, step by step, without having to scrap, update, maintain or rewrite a dozen programs for every new one you add.

ALL THE FEATURES NEEDED FOR SUCCESS.

No wonder when IDC asked users what they'd like to see changed about their particular package, Series 80 TOTAL was the only one of the three leading systems to receive a clean bill of health.

Many new features and facilities that have made Series 80 TOTAL a success come from the experiences of more than 2,000 users who, over the last decade, have used TOTAL in almost half their applications.

The end result is a DBMS whose architecture is conceived to accommodate distributed processing, data base machines, even migration to the new IBM 4300 (because it supports VSAM) and TIS, Cincom's revolutionary new Total Information System.

But don't take our word for it. Take the word of the users IDC surveyed.

Fill in the coupon below or call Dennis Yablonsky our national sales manager at (513) 662-2300, and we'll review all the pertinent details of the IDC study. We'll show you how Series 80 TOTAL looks as good on the job as other systems look on paper.

Contact us now. Because how well your data base system succeeds at its job may very likely determine how well you succeed at yours.

Please bring me proof of why Series 80 TOTAL outperforms the competition.

Name _____ Title _____

Company _____

Address _____

City State _____ Zip _____

Mail to: U.S.A.: Department D.C.
Cincom Systems, Inc., 2300 Montana Ave.,
Cincinnati, Ohio 45211, (513) 662-2300
International: Cincom Systems International,
17-19 Rue Montoyer, 1040 Brussels, Belgium,
(02) 511-6548

Programs Protected

FRAMINGHAM, Mass. — A package to protect Basic programs stored in Ascii form on Radio Shack TRS-80 microcomputers is available from Data Associates here.

Developed for single-disk system with 32K bytes of memory, Unlist8 can guard against unauthorized modification and can make Basic programs confidential, the vendor said.

Hidden passwords and copyright notices can be inserted to prohibit listing or printing programs. The program can, however, be run, saved, loaded in memory or loaded or saved on disk, as usual, according to the vendor.

Code line numbers, a single line or specific blocks of line numbers can

be unlisted. The package can also be used to "unprotect" or relist a protected program, provided the password for the program is known, the vendor said.

Since specific lines can be protected, other lines in a program can be changed or updated at will, the vendor added.

Unlist8 converts the named Basic program in Ascii form to a protected version. It also saves the program on the same disk under a new name selected by the user, Data Associates said.

Unlist8 costs \$19.95 with an instruction manual and three copies of the program on cassette. The vendor can be reached at P.O. Box 882, Framingham, Mass. 01701.

RSX-11 Moved to LSI-11

IRVINE, Calif. — An enhancement to Digital Equipment Corp.'s RSX-11M operating system that will reportedly provide full support to the DEC LSI-11 CPU is available from Plessey Peripheral Systems, Inc.

Plessey's PM-RSX-11M will run on mapped or unmapped, dedicated or multipurpose LSI-11 systems. Applications for the package include program development and industrial, scientific, business or communications applications. It also supports multitasking, dynamic memory management, the vendor said.

The Plessey enhancement offers a multiuser program development facility concurrent with real-time 250 software priority levels, which enables users to compile, install and debug tasks without affecting the real-time

task response, the vendor said.

The DEC RSX-11M enhancement allows full support of the LSI-11 processor and full unmapped RSX-11M executive with file system and all DEC PDP-11 clocks. The enhancement also provides support of Plessey's expanded capacity disks and a set DS16 command keyword option that allows the user to specify disk size, the vendor said.

Plessey's PM-RSX-11M operating system costs \$4,780 and comes on magnetic tape, the vendor said from 17466 Daimler, Irvine, Calif. 92714.

Pascal Chosen After Study

(Continued from Page 35)

- Design a package that is open-ended for future incorporation of additional facilities and capabilities.
- Reach fairly rapid stability — the product proved highly reliable during beta testing at user sites and settled down very quickly.

Some Disadvantages

However, there were certain less favorable aspects of Pascal which resulted in necessary additional work. For example, Pascal does not lend itself to producing the "overlay" modules necessary to allow our new version to operate at a minimum level in a 64K partition. We were obliged to change the mode in which Pascal operated in order to maintain the required overlay environment.

As it happened, the Pascal compiler we chose lacked certain I/O handling features. We built in all the routines required for both compile and subsequent package execution with assembler.

There were also some problems of operating environment dependency. Specifically, certain aspects of physical-level I/O and memory management native to the IBM environment could not be conveniently overcome using Pascal. We resolved these problems by the use of assembler.

Finally, Pascal did not provide patchable executable code. However, its ability to generate source-level Assembler code enabled us to modify the generated source code and solve the problem.

In conclusion, we feel that while the completed package is not totally transportable, 80% of it is, so primary design objectives have been met successfully.

We have satisfied ourselves that Pascal has proved an extremely valuable development tool. We have achieved a significant experience in its use, which we are certain to exploit profitably in the future.

Win
Your Medals
Every Day.
With INQUIRE®



Becoming a hero to the users of data processing is not an easy achievement. You gain esteem by supplying critical information on time; you become a hero when you do it consistently. Solving problems permanently and cost-effectively is another way of saying INQUIRE.

INQUIRE is the database management system with enough power to control an unlimited number of databases on-line or batch. It is sophisticated enough to provide fail-safe supervision over all data management activity, versatile enough to manage full-text databases, and easy enough to use that non-technical people can search through files and generate specific departmental reports themselves. Yet, INQUIRE provides enough privacy and security control to ensure that only the proper eyes see specific information.

Projects that have been waiting for years can now be done quickly with INQUIRE... in use today by thousands of people on major IBM and compatible mainframes under OS, VS, MVS and CMS. The Infodata family of products also includes IQnet, a DBMS-based system for the IBM 4300-series computers.

You'll win your first medal by finding out about INQUIRE, the problem-solving system that's beyond DBMS. Be a hero. Call Infodata today.

(703) 578-3430

Infodata®

Infodata Systems Inc.
5205 Leesburg Pike, Falls Church, Virginia 22041



COMMUNICATIONS

Comments to FCC Stir Debate On Accounting

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — What kind of accounting system should be established to keep AT&T honest? This question continues to provoke a hot debate at the Federal Communications Commission (FCC).

A year and a half ago, the commission said it wanted to revise telephone industry accounting procedures — formally known as the Uniform Systems of Accounts (USOA) — and asked interested parties for their comments on a number of related issues. Last August, after reviewing the first round of responses, the commission asked a new set of questions, and these were answered last month.

AT&T said the accounting system it has in mind is "closer in concept" to the FCC's views "than was perhaps origi-

nally realized." The company added that its proposed "system structure" implements the commission's intentions "in effect."

Possibly agreeing with AT&T on this point, the Independent Data Communications Manufacturers Association (IDCMA) argued that the commission has overlooked some key problems in its requests for comment; as a result, whatever new accounting system emerges from the present proceeding will fail to prevent AT&T from unfairly cross-subsidizing its competitive services. The commission has stated that one of its major reasons for changing the USOA is to prevent such cross-subsidies.

"It is clear that unless the costs of all activities associated with the carrier offering of terminal equipment are retrieved, a

(Continued on Page 38)

Says Rates Based on Cost Estimates

IDCMA Asks FCC to Nix Dataphone II

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — "AT&T's 'cost studies' do not reflect or even purport to reflect that actual costs of the devices at issue in this proceeding."

So said the Independent Data Communications Manufacturers Association (IDCMA) late last month when it petitioned the Federal Communications Commission (FCC) to reject AT&T's proposed Dataphone II tariff, now scheduled to become effective Jan. 24.

The tariff encompasses a new line of intelligent modems, which operate at 2,400- to 9,600 bit/sec, together with a centralized, highly automated network troubleshooting system [CW, Nov. 12].

AT&T has derived many of the costs of Dataphone II service "from estimates," IDCMA contended. Also, "the expenses of AT&T affiliates such as Bell Telephone Laboratories . . . and Western Electric are not even ascertained — let alone retrieved."

"In making these allocations, AT&T does not differentiate between equipment or transmis-

sion, competitive or noncompetitive services," the IDCMA added.

Second Objection

The association's other major objection to the proposed tariff is that it allegedly continues a tactic the FCC declared unlawful last October. At that time, the commission said "Unjustified and unlawful tariffs have remained in effect often for years while under investigation, only to be replaced by other tariffs which themselves are later found to be unlawful."

That quote comes from an FCC decision rejecting AT&T's Multischedule Private Line (MPL) rates, which cover charges for individual voice-grade private-line services. The MPL rates, which went into effect in 1976, have been the object of an extended FCC investigation.

In October, the commission ordered the phone company to develop new rates based on an "interim cost allocation procedure." Bell was given until mid-1980 to make this change while the old rates remained in effect. The FCC ordered AT&T to imple-

ment the new cost allocation procedures "for all tariff filings made after the effectiveness of the [MPL] order," IDCMA pointed out.

The association added that the commission also ordered AT&T to explain how it intends to implement the new procedures. This latter information was supplied late last month, but it was supposed to be developed well

before Oct. 26, the date AT&T filed its Dataphone II tariff.

Major Complaint

IDCMA's major complaint is that "despite the commission's unambiguous directives," AT&T failed to base its costs for Dataphone II service on the interim procedures. Instead, the phone company told the FCC that an

(Continued on Page 38)

Swift Operations Center Starts Up in Culpepper, Va.

CW Washington Bureau

CULPEPPER, Va. — The Society for Worldwide Interbank Financial Telecommunications (Swift) has opened a North American Operations Center here, the third in its rapidly growing network.

Founded in 1973 by 239 banks in Europe, the U.S. and Canada, Swift started up its network in September 1977. It initially served 15 countries; today there are close to 750 members and the network links 26 countries.

In a single day last June, the

Swift network handled more than 150,000 messages involving several types of transactions.

The North American operations center here in Culpepper, about 65 miles south of Washington, D.C., serves North and South America and the Far East. Other centers are located in Brussels and Amsterdam.

Each center communicates with member banks through a concentrated "regional processor" and leased domestic circuits within each country.

Other Products

- Texas Instruments 745, 765, 820, 810, 733
- Vadic Modems & Couplers
- DEC LA-34, LA-120, VT-100, LA-36
- Lear Seigler ADM 3A, ADM 31 ADM 42

TTL \$37⁰⁰
w/EIA \$41⁰⁰ MTH

NEW
VT 52's
IN STOCK
READY
TO SHIP

Call:

Boston: Joann (617) 235-7055

Fairfield Area: Nancy (203) 357-0004

New York Area: Bob (212) 354-9886

New Jersey: Rosanne (201) 455-1300

Chicago: Eileen (312) 296-0830

TOLL FREE 800-243-9006

IN CONN. 203-357-0004

WE'RE SO EXCITED
WE'RE BESIDE OURSELVES

We also carry the new NCC-Series 8000 Computer System

- Commercial
- Scientific
- Word Processing
- Graphics



TELETYPE 43

with ANDERSON JACOBSON 243 \$49.00

- The Teletype Model 43 has proven to be so reliable that National Computer is taking the bold step of offering the Teletype 43 with maintenance but not charging for it.
- Purchase and equity leasing available.
- Above rates are for one-year leases. Beyond one year you may keep it or return it. If you keep it, it's month to month. Never is a renewal necessary at National Computer.
- Limit 200 units on this special program.

NATIONAL COMPUTER
Communications Corp.
The Greatest Name in Terminals
260 West Avenue, Stamford, CT 06904

Handles Calls to 1,243 Users

CBX Lightens Utility's Customer Service Load

By a CW Staff Writer

SALT LAKE CITY, Utah — A large power company here has found its four month-old computerized business telephone system (CBX) easier to operate and more flexible than its previous switching system.

Utah Power and Light Co. (UP&L) began to run its system in August. The CBX handles 1,243 employee users and should cost less than the system it replaced when amortized over a 10-year period.

And it makes possible highly flexible communications be-

tween the different parts of the utility, according to Dennis Young, the firm's telephone maintenance supervisor.

Serving customers throughout most of Utah, southeast Idaho and southwest Wyoming, UP&L uses a pair of Rolm Corp. CBX switches at its service and division offices, tying them to Rolm's Large-scale CBX (LCBX) at UP&L's general offices here.

The CBX system automatically answers, generates and distributes calls on a first-

come, first-served queuing basis and generates printed statistical reports on line volume and incoming traffic distribution. The LCBX serves as a switching point for 50 tie trunk lines to the utility's outlying offices and generating stations around the state.

Reason for Purchase

UP&L purchased the equipment largely because it wanted to improve the quality of its customer service and to adequately coordinate repairs, storm service and other activities from its downtown office and its Salt Lake service center.

The utility found that it would not have to concern itself with obsolescence because

the Rolm system is organized on a computer program instead of a hard-wired system. This makes it far easier to re-configure, according to Young.

In addition to the switching system, UP&L uses 145 of Rolm's Electronic Telephone System (ETS) 100 phones. These allow the firm to retain its present three-wire connection system while providing a variety of other communications abilities it did not have before.

For instance, a secretary at an ETS 100 can answer any ringing extension — noting which extension is being called on a lighted electronic display — then transfer the call to any single-line phone in

the system.

"I can turn a conversation [between two people] into an eight-party conference call, which no conventional phone could do," Young noted.

No Complaints

Young had no complaints about the Rolm system. Rolm provided training for three of its electronic maintenance personnel at its Santa Clara headquarters. To date, they have been able to handle about 95% of the problems that have cropped up.

In spite of minor circuit board failures (about two a week), UP&L has endorsed the Rolm system to prospective buyers, Young said.

COMPUTER OPERATIONS

PLANNING EDP EXPANSION? New Site? Modernization of Existing Facilities?

D.P. Facilities Engineers and Designers
have 20 plus years of experience to move
your facility into the next generation.

- Advance Techniques in Architectural, Engineering and Interior Design.
- Construction Methods & Materials
- Environmental Air-Conditioning
- Uninterruptible Power & Voltage Stabilization
- Fire Detection & Suppression
- Total Security

TIME A FACTOR? Call our D/C expedite group today — for a guaranteed completion date.

(212) 674-8600

D.P. FACILITIES INC., NATIONAL
Div. F.C.I. Facilities Construction, Inc.
250 Park Ave. South, N.Y. 10003

TELETYPE®

Station Controllers-Modems-Data Sets



Model-40



Model-43



Model-35

Model-33

Models 28, 32, 33, 35, 40, 4210 and 43

- 81D1, 83B3, 4VH, FINAC
- 8A1, 8B1, 85A1, 85A2, 86A1, 86A2, 86B1, 86B2
- Dataphone, Telex, TWX and TWX/DDD

FEDERAL
Communications
Corporation
11126 Shady Trail, Dallas, Texas 75229 U.S.A.
(214) 620-0644 TELEX 73221

IDCMA Hits Dataphone II

(Continued from Page 37)
"initial review" of the MPL decision "indicates" it will have "minimal effect" on the costs underlying the Dataphone II tariff filing.

"AT&T has in effect stated that it need not provide data which the commission has deemed essential on the sole basis that in its view such data is not necessary. If . . . carrier accountability is to be realized, the commission must make it clear that carriers are not to be allowed to disregard valid commission orders at will," the IDCMA maintained.

At the bottom of this controversy is AT&T's insistence on continuing to assign many costs of its private-line services to MTS/WATS. The FCC, in its MPL decision last October, said "the record clearly reveals that AT&T [has] employed a 'basic service' approach to allocate local exchange plant costs . . . Through its continued use of these residual costing techniques, AT&T retains the freedom to load, arbitrarily and unlawfully, all costs not allocated to other services on MTS users."

"AT&T's failure to calculate exchange plant costs for MTS directly [makes] it extremely difficult to verify that [private-line] costs have not been improperly assigned to the residual [MTS/WATS] services."

representing the nation's major modem makers.

"The exclusion of Western Electric and Bell Telephone Laboratories from the [proposed] accounting system will unreasonably restrict the ability of the commission to determine, let alone assure, the lawfulness of AT&T's rates for such equipment," IDCMA added. "If [these] entities are to be outside the scope of the accounting system . . . the FCC must find some other method to prevent the serious problem of intercompany cross-subsidization."

The Association of Data Processing Service Organizations (Adapsco) criticized the commission for ignoring the anticompetitive threat posed by "tying," which it defined as an arrangement enabling a firm to use "the strength it possesses in one aspect of its operation . . . to enhance its sales or profits in another part of its operations . . . by coupling the

sale or lease of two or more goods or services.

"In other words, economic power over one product (the tying product) is used to induce customers to purchase another product (the tied product) for reasons unrelated to the price or quality of the tied product. Ties may involve coercion or they may be voluntary . . . [but] whether voluntary or involuntary, the effects . . . are the same: the suppression of competition."

To prevent tying, Adapsco indicated the commission should require AT&T to form fully separated subsidiaries for its competitive services, in addition to imposing a new uniform system of accounts.

Instead, the FCC, as reflected in the questions it has asked in the USOA proceeding, appears to regard "cost-of-service accounting systems and . . . structural separation [as] mutually exclusive regulatory alternatives."



LRP-300 Reader/Punch

Cost Effective ASR For Your Terminal... ...NOW!

DSI's LRP-300 Reader/Punch Combo adds 300 baud ASR storage and edit capability to any RS-232 or TTY current loop terminal. Just plug in between terminal and modem and you're ready to go. Our whisper quiet field-proven MODUPERF system is backed by a one year warranty. At only \$1,495, the system pays for itself by improved accuracy, data throughput, and reduced line charges in a matter of months. Don't wait to go ASR. Order your LRP-300 and start saving line costs NOW. DEALER INQUIRIES INVITED.

Product of U.S.A.

DATA SPECIALTIES, INC.
3455 Commercial
Northbrook, IL 60062
(312) 566-1800 TLX 206230

Four for the price of one. On the double.



Our new DS990 business systems deliver four times the data storage you'd expect for the price. In short order.

Here's some very good news. Our powerful new business computer systems, the DS990 Models 1 and 2, are affordable. For example, the Model 1 starts at under \$10,000*.

Here's even better news. You don't have to wait for them. Our recent manufacturing expansion now allows normal delivery within 30 days.

Now for the best news. We packed our new systems with double-sided, double-density diskettes that

provide four times the data storage of many comparably priced single-sided, single-density diskette systems.

Since these small systems are compatible with our full line of larger DS990 computers, they'll provide efficient data management today and easily expand to meet your needs tomorrow.

You can order either system complete with TI's multi-tasking TX5 Operating System and BASIC or FORTRAN. Pascal programs developed on larger DS990 systems will also run under TX5. In addition, the Model 1 features TPL, the easy-to-use forms generation and data entry software package of our Series 700 Distributed Processing Systems.

Like every TI computer product, these new systems are backed

*U.S. Domestic prices

by our worldwide network of highly trained service specialists.

Now you can solve your problems reliably and efficiently using small business computers from Texas Instruments —the company appointed the official computer and calculator company of the 1980 Olympic Winter Games.

For more information about our money-saving DS990 business systems, contact your nearest TI sales office or write: Texas Instruments Incorporated, P.O. Box 1444, M/S 7784, Houston, Texas 77001. In Europe write: Boîte Postale 5, 06270 Villeneuve-Loubet, France.

TEXAS INSTRUMENTS
INCORPORATED

Copyright © 1979, Texas Instruments Incorporated



TEXAS INSTRUMENTS

We put computing within everyone's reach.

Transmission Converters Introduced

COSTA MESA, Calif. — With a transmission protocol converter from MSI Data Corp., portable terminals that output 8-bit ASCII or 5-bit binary code can interface to any host computer with synchronous line controllers, the vendor said.

The MSI 2731 is installed between the host computer's input port and a modem. It controls the modem, reverse channel, code and speed conversion while remaining transparent to the host processor, MSI said.

In its automatic mode, the converter determines from the first character received what kind of terminal is transmitting and locks onto that transmission.

When the converter is in manual mode, front-panel switch settings allow the user to configure parameters for reception of a particular transmission type, the vendor said.

The 2731 handles incoming data transmitted at rates ranging from 110- to 1,350 bit/sec — when using an AT&T 202 or equivalent modem — and outputs an 8-bit character code at 1,200- to 9,600 bit/sec.

The protocol converter costs \$2,000.

MSI also released its Model 2732, which converts asynchronous transmissions from portable terminals for any host computer or communications controller utilizing IBM bisynchronous, 3780/2780 or

3741 protocol.

The MSI 2732 can also output data from a terminal to its own optional one- to four-drive diskette subsystem, allowing it to function as a two-line stand-alone receiver. Each disk drive is a 256K-byte unit.

When connected to a local bisynchronous loop, the MSI 2732 appears to the host as an AT&T synchronous-type modem receiving data from either an IBM 3780/2780 or 3741, according to MSI.

The MSI 2732 costs \$6,000 without diskettes. It is priced from \$8,000 to \$13,000 with the diskette subsystem, MSI said from 439 Fischer Ave., Costa Mesa, Calif. 92626.

Zentec Debuts Smart Terminal At Comdex '79

LAS VEGAS — A little-known manufacturer of intelligent CRT terminals last week introduced a "smart" terminal that reportedly offers performance comparable to a Lear Siegler, Inc. ADM-31 and similar units from other makers.

Zentec Corp. described its latest offering, Zephyr, as the first member of a smart terminal family that costs less than competing models from Lear, Haatzline Corp., Beehive International, Inc., Applied Digital Data Systems, Inc. and others.

Shown last week here at the Comdex '79 show, Zephyr is based on an Intel Corp. 8085 microprocessor. The terminal has a 12-in. CRT that displays 24 80-char. lines, with a 25th line for status information and error messages.

The terminal stores up to two 1,920-char. pages. Its 128-char. ASCII character set can be enhanced with program-controlled CRT features like reverse background, blinking and underscoring, Zentec said.

The terminal provides intelligent features like cursor addressability, editing and protected-form mode. As part of an integrated keyboard, Zephyr offers a numeric keypad, cursor control keys, 12 special-purpose function keys and 16 programmable function keys.

Zephyr offers both RS-232C and 20mA interfaces. A serial printer interface operating at speeds up to 9,600 bit/sec is optional.

The Zephyr costs \$1,200 from Zentec at 2400 Walsh Ave., Santa Clara, Calif. 95050.

Phone Net Future Topic of Seminar

NEW YORK — How will the development of digital systems affect the telephone network of the future? A one-day seminar held here on Jan. 22 by Probe Research, Inc. will explore the problems and opportunities of the digital revolution.

Probe Research will hold the seminar to identify and analyze such issues as the new features required for a digital environment, the "digital traps" that might lure unwary customers and the future of fiber optics.

The seminar will be conducted by Lee Goeller, author of a study entitled "The Digital Future of the Telephone Network."

A fee of \$195 includes seminar materials and lunch at the Biltmore Hotel, according to Probe, which can be reached at P.O. Box 251, Millburn, N.J. 07041.

Long-Line Adapter Fits Vector General Units

WOODLAND HILLS, Calif. — Users of Vector General, Inc.'s Series 3300 and 3400 graphics display systems can order a long-line adapter to run remote digital devices up to 600 ft. from the main controller.

The option allows the remote placement of keyboards, function switches and data tablets. The adapter costs less than \$2,700 from the vendor at 21300 Oxnard St., Woodland Hills, Calif. 91364.

Replace Your Honeywell VIP Terminal With...

...the full line of ITT Courier information display terminals. Compatibility with the Honeywell VIP 7700/7760 makes replacement easy. Compatibility, combined with years of experience in building terminals that help people to do more with the computer, make ITT Courier terminals the world's finest choice for the Honeywell terminal user.

ITT Courier terminal systems are engineered to reduce operator fatigue and to simplify terminal use. Crisp, clean characters read easily on the non-glare screen. Comfortable, high-speed keyboards, operator-selectable cursor functions, status lights to keep you informed of each function, all contribute to a new level of on-line productivity.

Functionally, ITT Courier terminals surpass basic Honeywell capabilities with display sizes of 960 characters and 1920 characters, a wide spectrum of printers, and three VIP

compatible controllers. Three different keyboards are available. Terminals may be stand-alone or clustered, with redundant controller models available to yield unusually high system availability. An optional diskette subsystem may be attached for efficient Distributed Format Storage or economical Deferred Data Transmission.

Honeywell system compatibility is just one more reason the performance-tested family of ITT Courier terminals are the world's largest Honeywell VIP 7700/7760 and IBM 3270 replacements, with an installed base of equipment today surpassing a quarter billion dollars.

If you have been searching for a quality terminal with Honeywell VIP 7700/7760 compatibility, call us. We'll be glad to show you why we are the best price performers in the business. At ITT Courier, productivity is our product.



ITT Courier[®]

ITT Courier Terminal Systems, Inc.

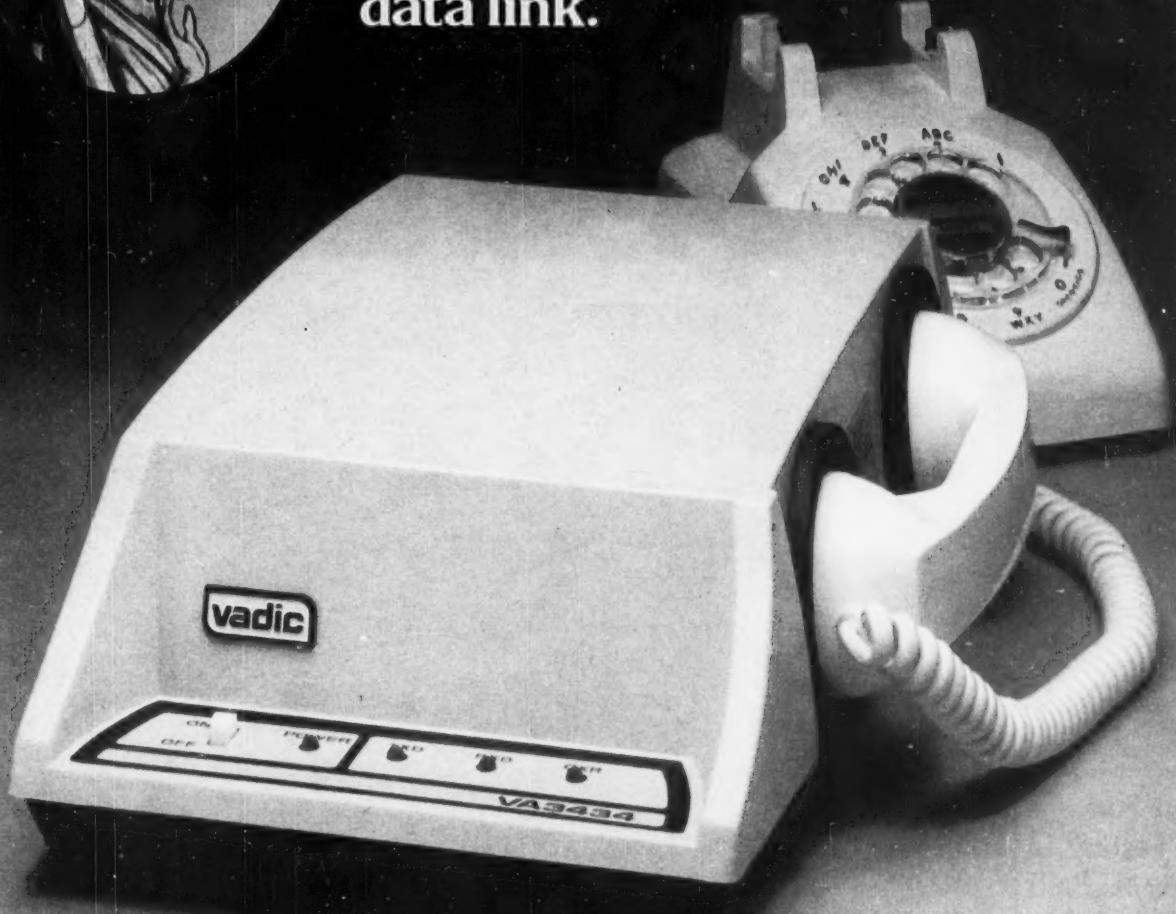
Corporate Headquarters
1515 W. 14th Street, Tempe, Arizona 85281
Telephone (800) 528-1400

Atlanta 404/329-9472 • Boston 617/890-9595 • Charlotte 704/523-2401 • Chicago 312/920-2770 • Cincinnati 513/583-8050 • Cleveland 216/447-0455 • Columbus 614/866-0258
Dallas 214/233-9002 • Denver 303/423-9920 • Detroit 313/559-3090 • Hartford 203/569-4915 • Houston 713/780-0309 • Indianapolis 317/783-2074 • Kansas City 913/483-6530
Los Angeles-North 213/879-1831 • Los Angeles-Orange 714/547-8202 • Miami 305/442-2845 • Milwaukee 414/782-0776 • Minneapolis 612/941-124 • Mobile 319/286-8620 • Montreal 514/337-4841
New York 212/751-0500 • North New Jersey 201/935-3900 • Oklahoma City 405/949-0077 • Ottawa 613/236-5526 • Philadelphia 215/265-7620 • Phoenix 602/266-5583 • Pittsburgh 412/923-2446
Rochester 716/481-5700 • San Francisco 415/434-3730 • Seattle 206/262-9206 • St. Louis 314/434-3199 • Toronto 416/676-9300 • Vancouver 604/682-2751 • Washington DC 301/459-3000



Dear Ma:

With Racal-Vadic's VA3434 acoustic coupler, every telephone becomes a 1200 bps full duplex data link.



Racal-Vadic is in full production on an acoustic coupler that operates at 1200 bits per second, full duplex. Thousands are already installed and operational.

This is great news for remote terminal users who will no longer have to settle for 300 bps acoustic operation. Now, merely by replacing your present coupler with the VA3434, you can step up to 1200 bps full duplex, using the same 103 type protocol, yet retaining the portability that only an acoustic coupler provides. And since data flows 4 times faster, phone charges may be less, too.

More good news. The VA3434 is compatible with Racial-Vadic's VA3400 Series, including the VA3467 computer site triple modem.

Where can you obtain the VA3434? Easy. Just phone the nearest Racal-Vadic stocking rep. They're listed below.

Racal-Vadic

222 Caspian Drive, Sunnyvale, CA 94086
Tel: (408) 744-0810 • TWX: 910-339-9297

RACAL
The Electronics Group

Racial-Vadic Regional Offices: West: (408) 744-1727 • East: (301) 459-7430 •
Central: (312) 296-8018 • Northeast: (617) 245-8790

Available from these stocking reps...

Alabama: (800) 327-6600 • **Alaska:** (907) 344-1141 • **Arizona:** (602) 947-7841 • **California:** S.F. (408) 249-2491, L.A. (714) 635-7600, S.D. (714) 578-5760 • **Canada:** Calgary (403) 243-2202, Montreal (514) 849-9491, Toronto (416) 675-7500, Vancouver (604) 681-8136 • **Colorado:** (303) 779-3600 • **Conn.:** (203) 265-0215 • **District of Columbia:** (301) 622-3535 • **Florida:** Ft. Lauderdale (800) 432-4480, Orlando (305) 423-7615, St. Petersburg (800) 432-4480 • **Georgia:** (800) 327-6600 • **Illinois:** (312) 255-4820 • **Indiana:** (317) 486-2591 • **Kansas:** (316) 362-2366 • **Maryland:** (301) 622-3535 • **Mass.:** (617) 245-8900 • **Michigan:** (313) 973-1133 • **Minnesota:** (612) 944-3515 • **Missouri:** (314) 821-3742 • **New Jersey:** North (201) 445-5210, South (609) 779-0200 • **New York:** Binghampton (607) 785-9947, NYC (212) 695-4269, Rochester (716) 473-5720, Syracuse (315) 437-6666 • **N.C.:** (800) 527-6600 • **Ohio:** Cleveland (216) 333-3375 • **Oregon:** (503) 224-3145 • **Penn.:** East (609) 779-0200, West (412) 681-8009 • **S. Carolina:** (800) 327-6600 • **Texas:** Austin (512) 451-0217, Dallas (214) 231-2573, Houston (713) 688-9971 • **Utah:** (801) 484-4495 • **West:** (206) 763-2755 • **Wisconsin:** (414) 747-6637

IDS Expands Test Family Modem Tester Based on MPU

LINCOLN, R.I. — A microprocessor-based polling tester that tests modems over simulated or actual switched networks is available from International Data Sciences, Inc. (IDS).

The Model 1700 can also be used for private-line point-to-point nets or private-line multidropped nets. The tester is claimed to reduce downtime and improve maintenance efficiency by polling on-line data communications equipment for fault isolation and by verifying acceptable system performance.

The 1700 can distinguish between outbound and inbound polling message errors and allows deliberate injection of these errors to verify that integrity safeguards are functional, IDS said. The tester costs \$1,800.

Selector Switch

IDS also unveiled a selector switch as well as a bit error rate tester and EIA breakout panel.

The Model 8506-D selector switch is used to switch the 15-pin EIA RS-232 or CCITT V.24 interface to either of two outputs. It can reportedly switch one modem to either of two front-end processor data channels or to either of two data terminals. The 8506-D can also switch a data channel from its on-line modem to a backup modem or can switch from a leased line.

Breakout Box Allows Testing Of RS-232C Path

WOODBURY, N.Y. — Users can reportedly refigure their RS-232C interfaces when interconnecting new devices or troubleshooting existing networks with a breakout box from Remark International, Inc.

The Model 50 contains 24 miniature switches that allow each signal of the interface to be individually opened. Two sets of 24 test points — one set on each side of the switches — facilitate patching of the interface configuration and signal monitoring.

The breakout box includes common bus areas for multi-point connections, according to the vendor.

A user can find defective network components by performing loopback functions anywhere on the RS-232C or CCITT data path. When operated in conjunction with Remark's Model 40 line monitor, the Model 50 works as an interface tester.

The Model 50 is supplied with six jumper plugs and costs \$79 from Remark at 4 Sycamore Drive, Woodbury, N.Y. 11797.

modem to a dial-up modem. It costs \$155.

Test Set

The Model 65/60 is two separate test pieces in one.

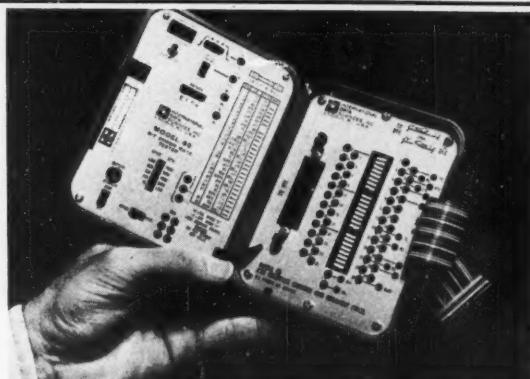
The Model 65 is a self-contained test set capable of analyzing the bit error rate of digital data communication channels. It contains separate transmitter and receiver sections that allow full-duplex

tests to be performed in either end-to-end or loopback configurations.

The Model 60 is an EIA monitor and breakout panel.

The 65/60 costs \$650. Battery chargers are \$20 and come in two models — the 22 and 23 — for 115V and 230V operation, respectively.

IDS is located at 7 Wellington Road, Lincoln, R.I. 02865.



The Model 65/60 Test Set and EIA Monitor

24-hr. data pick-



Bit-Oriented Protocols Monitored

SPRINGFIELD, Va. — A diagnostic line monitor from Dynatech Data Systems, Inc. reportedly operates with all standard communications formats and protocols and with new and future bit-oriented protocols.

The microprocessor-based Dyna-Test 1500 provides operator-prompting through a 5-in. diagonal CRT to aid in defining a system's protocol and to perform data line monitoring functions. It operates with up to five languages; Ascii and Ebcidic are standard.

Capable of operation at speeds up to 110K bit/sec, the Dyna-Test 1500 features a non-

volatile memory, interface breakout panel and a 200,000-char. mass capture tape system. The system monitors, displays and records data, shows the status of six control leads, displays transmission errors and traps data on character strings.

The monitor operates with CCITT V.24, RS-232C and MIL-188 interfaces. CCITT V.35, Bell 303, IBM 3600 and RS-449 interfaces are available as options.

The monitor costs \$4,700 without tape and \$7,000 with tape, the vendor said from 7644 Dynatech Court, Springfield, Va. 22153.

Bell-Compatible Modems Feature Integral DAA

PALO ALTO, Calif. — Users can transmit 300 bit/sec asynchronous data without an external Data Access Arrangement (DAA) with three modems from Prentice Corp.

The Prentice P103J originate/auto-answer, P113C originate and P113D auto-answer modems directly replace the Western Electric Co. 103J, 113C and 113D modems, respectively. They are

also end-to-end compatible with Prentice 113A/B and E Western Electric 113A/B and 212A modems, Prentice said.

With a standard RS-232C interface and a line interface defined in Part 68 of Federal Communications Commission regulations, the three units offer half- or full-duplex transmission and reception of serial binary asynchronous data over two-wire dial-up phone facilities.

An integral DAA allows direct connection of the modems to the switched telephone network by means of a modular jack. Moreover, the modems include built-in diagnostics.

Stand-alone versions of the P103J, P113C and P113D cost \$470, \$385 and \$395, respectively, and include the modem card and power supply. Rack-mounted systems are also available, Prentice said from 795 San Antonio Road, Palo Alto, Calif. 94303.

RS-232 Monitors Offer Switching, Cascade Abilities

PALO ALTO, Calif. — A trio of RS-232C interface monitors are available with three-way switching and cascade ability from Giltronix, Inc.

The line monitor section monitors the interface signals with LEDs, while the three-way switch allows a variety of system configurations. The units can be cascaded to allow the switching of an unlimited number of devices, Giltronix said.

The Models GRS 232-SM8 and GRS 232-SM16 monitor eight and 16 channels respectively, while the GRS 232-SMC offers monitoring for 16 channels plus a pair of options:

- Signal monitoring, which is accomplished by connecting an eighth LED to any one of the 25 EIA pins to monitor a specific EIA signal.

- An additional switching option that allows the user to define any three EIA pins to replace pins 17, 18 and 25.

The GRS 232-SM8 and 232-SM16 cost \$149.95 and \$179.95 respectively, while the 232-SMC costs \$199.95, a spokesman said from 3156 Avalon, Palo Alto, Calif. 94036.

Up and delivery.



Problem Data is one thing there's no shortage of. The business problem today is getting the right data to where it's needed in a form that's useful.

In fact, American businesses are now spending nearly as much to transmit data as to process it. And as much as 40 percent of the nation's data processing capability is tied up in operations performed solely for the purpose of transmitting the data.

Solution We at the Bell System have conducted many-faceted studies of the data communication needs of our customers. And we've developed systems to meet those needs.

Consequently, today, whatever your concern—multipoint inquiry-response or order entry; credit, inventory, or payroll; analog or digital; large-scale or small—we have a solution.

There are Bell System communications specialists for every sector of industry, ready to advise you. And there's equipment covering broad degrees of sophistication, all backed by the incomparable Bell System maintenance staff—230,000 strong.

If you haven't talked systems with your problem-solving Bell Account Executive lately, your firm is missing something. In voice, data, and network services.

The system is the solution.



FOR COMPARATIVE INFORMATION ON MINI-COMPUTER SYSTEMS —
BENCHMARK REPORT
 published by the Association of Computer Users
 for complete information and a
 complimentary copy of the
 ACU Newsletter, staple this ad
 to your letterhead.
 ACU
 Box 9003
 Boulder, CO
 80301

Big savings from AJ on TTYs, couplers, and modems.

Off-lease equipment, refurbished by AJ at the factory.

ASR 33 — \$725 (Qty. 1) Or lease for as low as \$49/month (36-month lease), including service.

KSR 33 — \$595 (Qty. 1) Or lease for as low as \$45/month (36-month lease), including service.

- 30-day parts/labor warranty*
- Send and receive
- Paper tape punch
- Pedestal mounted
- Visa or Master Charge

AJ Couplers/Modems

- The Cadillacs of the industry
- Some models under \$100
- 30-day parts/labor warranty*
- Variety of models — up to 1200 bps
- Fast delivery
- Nationwide AJ service network
- Visa or Master Charge

Quantities limited and first-come, first-served. So call toll-free now: (800) 538-9721.

California residents call (408) 263-8520.

Prices subject to change without notice.

*Details available on request.

ANDERSON JACOBSON



MTI Line Printer of the Month: Dataproducts 2260. Only \$7995!

Save a bundle on the 600 LPM standard of the industry.

This December, Len, Diana, Bert and the MTI crew are selling the 2260 for only \$7995. This Dataproducts rugged and reliable drum printer provides high quality, medium speed impact printing, and is ideally suited for small computer systems.

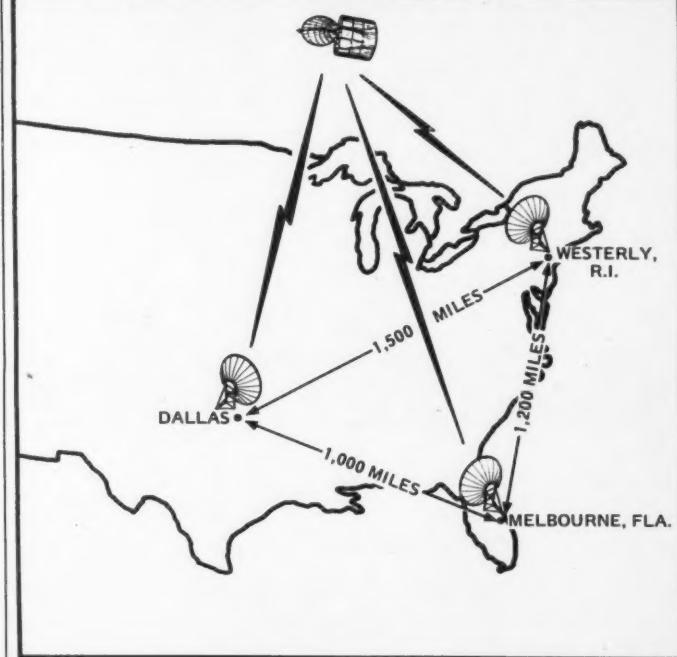
And MTI can provide you with a wide variety of options, accessories and interfaces to customize the 2260 to your particular application.

So this December, save a bundle on the 2260 and get acquainted with MTI. We have all the terminals, peripherals, applications know-how and service you'll ever need at prices that you'll find hard to beat. Call MTI today at: 516/482-3500, 212/895-7177, 800/645-8016 and in Ohio: 216/464-6688.



Applications Specialists and Distributors:
DEC, Hazeltine, Lear Siegler, Dataproducts, Texas Instruments, Teletype, Diablo Techtron, General DataComm, Anderson Jacobson, Omnitel, MFE and Intel
159 Northern Boulevard/Great Neck, New York 11021
24000 Mercantile Road, No. 7/Beachwood, Ohio 44122

Harris Asks FCC Approval For Private Satellite Net



Harris Corporation's Private Satellite Communications Network
Harris Corp.'s Proposed Private Satellite Network

MELBOURNE, Fla. — Harris Corp. has applied to the Federal Communications Commission (FCC) for authority to construct and operate a satellite communications system to transmit information between its Florida, Rhode Island and Texas facilities.

The network will permit two-way television communications as well as voice, data and facsimile message transmission and may save 10% to 20% on the company's \$5 million annual costs for long-distance phone and communications service, according to the firm.

If the private network is approved, Harris will install earth stations at the sites in six months, each with a 36-ft

diameter "dish" antenna designed and manufactured by the firm. It will lease satellite time on Western Electric Co.'s Westar III satellite.

One of the satellite terminals is to be located at company headquarters here in Melbourne, a second will be located in the Westerly, R.I., plant and the third will be installed at Harris' Dallas-based Data Communications Division.

Other Harris divisions will be served from the closest of the three satellite earth stations, which should be lower long-distance costs. The system may eventually be used for electronic mail, communicating word processors and high-speed, high-resolution facsimile transmission, Harris said.

RCA Americom Proposes Spare Ground Satellite

PISCATAWAY, N.J. — RCA Americom Communications, Inc. (RCA Americom) has asked the Federal Communications Commission (FCC) for the authority to construct an additional communications satellite to be used as a ground spare for a planned in-orbit system to operate in 1981.

On filing its application, RCA indicated it has demonstrated that sufficient demand exists for its four in-orbit Satcom satellites and that a ground spare should be available for launch-

ing should one of the orbiting systems fail.

The \$24 million spare will have the same essential elements as those already authorized by the FCC, but will add technological improvements such as four on-board spare amplifiers for each bank of six primary amplifiers, according to the common carrier.

RCA will also install 5.5W traveling wave amplifiers in place of the 5W systems used in Satcom Models I, II and III, a spokesman added.

Cassette Reader Unveiled

VAN NUYS, Calif. — A cassette reader for NCR Corp. 250 and 2140 cash registers can be remotely controlled by Ascii commands through an RS-232C serial interface, according to its vendor, Interdyne Co.

The Interfaced Cassette Systems (ICS) 3802-NCR-2 is a read-only buffered cassette system that accommo-

dates blocks of up to 440 bytes (optionally available for up to 940 bytes) at rates from 110- to 19.2K bit/sec, according to Interdyne.

The desktop 3802 works with Basic and Cobol, as well as lower level languages. It costs \$2,050 from Interdyne at 14761 Califa St., Van Nuys, Calif. 91411.

Hewlett-Packard Computer Advances

Vol. 4 No. 5 December 1979

A large, abstract geometric graphic is centered on the page. It consists of several large, irregular polygons formed by white lines on a dark background. Some of these polygons are filled with a dark, stippled pattern. The overall effect is reminiscent of a wireframe model or a complex circuit board layout.

HP1000:
Crunching matrices
and slicing time

HP3000:
Compact power
for business systems
and networks

The matrix machine

The Vector Instruction Set (VIS) gives the HP1000 F-Series computer a capability unique in the minicomputer industry: efficient and fast operation on matrices of data in a 16-bit computer.

VIS, a set of microcoded CPU instructions, fits the F-Series for applications that require manipulation of large, multi-dimensional arrays of data such as statistical analysis, 3D graphics rotation, structural analysis, image processing, and electronic circuit simulation. Such applications frequently require that a company purchase time on a mainframe, or buy a large computer, even when most of its applications do not justify such an expense.

With VIS, the HP1000 Model 45 becomes the Matrix Machine, the optimized system for scientific and engineering computation. This

F-Series model comes with the RTE-IVB real-time executive operating system, which can manage up to 2 million bytes of main memory. The base system includes the 2648A graphics terminal, GRAPHICS/1000 software package, and the high-performance HP7906 20-megabyte disc drive.

- The HP1000 F-Series with VIS will provide the fastest minicomputer solution to many matrix operations.
- It can avoid the "overkill" of buying an expensive computer for a few speed-critical operations.
- And it provides room for expansion by speeding up present operations and freeing the CPU for other jobs.

Vector arithmetic

VIS expands the computational power of the F-Series processor by speeding matrix computations.

In most small computers, matrix operations are executed in FORTRAN DO loops, in which a single pair of numbers is brought from memory and combined according to the specific instruction, then the next pair brought, etc. The overhead associated with these

fetch operations eats up CPU time.

VIS acts directly on whole groups of numbers, called vectors, improving execution speed by an order of magnitude.

The basic element of a vector, called a scalar, has a single distinct value. A vector is a set of scalars that share some common attribute; they may be X-axis coordinates, for example, in a 3D graphics problem.

Pipelined processing

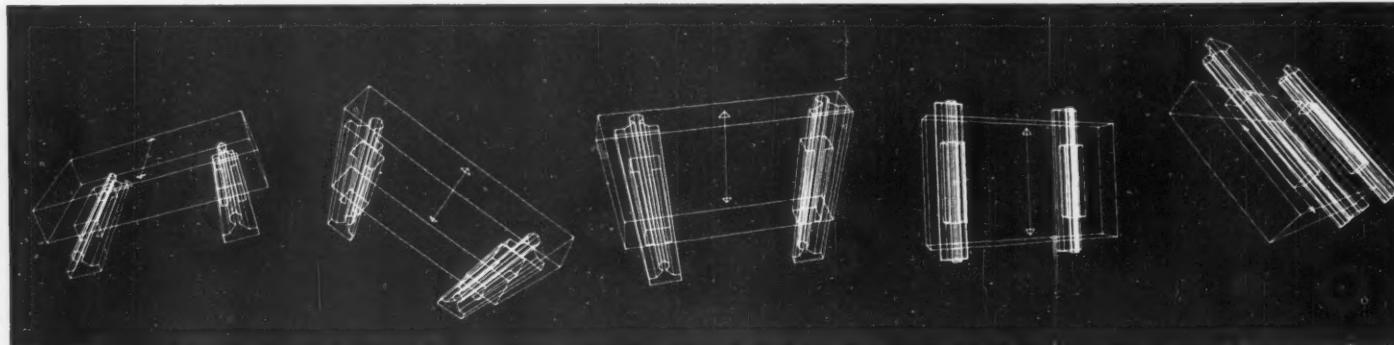
The F-Series computer performs vector arithmetic; that is, a single VIS instruction tells the CPU that the operation is to be performed on all scalars in a given vector.

With such an instruction, the CPU can pipeline the HP1000 floating point processor so as to achieve parallel processing of several elements in the vector. While the floating point processor is operating on two scalars, the CPU fetches the next pair from memory. Without VIS, the CPU would have to return to the DO loop for a new instruction each time it completed an operation, and then go search for the next pair of scalars.

Managing DO loops and chasing scalars can account for 90 percent

◀ Cover (and below)

Rotating in accordance with calculations supplied by the Vector Instruction Set, the image of an object can be viewed from any angle on a Hewlett-Packard 2647A graphics terminal. These images and the one on the cover were generated by a matrix rotation program running on an HP1000 F-Series computer with micro-coded instructions for performing vector arithmetic.



of matrix computation time. Here's an example:

Rotating an image

A 3D image may be rotated a specified amount by multiplying its present XYZ coordinate matrix by a rotation matrix. In FORTRAN, this operation must be carried out by multiplying each element in each rotation matrix column by each element in each coordinate matrix row. It takes nine multiplications and nine additions to establish a single point.

The FORTRAN instructions for rotating a 1000-point image look like this:

```
DO 10 I=1,3
DO 10 J=1, 1000
  B(I,J)=0.0
DO 10 L=1,3
  10 B(I,J)=B(I,J)+R(I,L)*A(L,J)
```

The execution time is 920 msec.

With VIS, the HP1000 can simplify the operation. Instead of a series of separate multiplications, VIS multiplies each rotational coordinate by an entire column of the coordinate matrix. The instructions look like this:

```
DO 10 I=1,3
CALL VSMY (R(I,1), A(1,1),3,
  B(I,1),3,N
CALL VPIV(R(I,2),A(2,1),3
  B(I,1),3,B(I,1),3,N
10 CALL VPIV(I,3),A(3,1),3,
  B(I,1),3,B(I,1),3,N
```

The execution time using VIS is 90 msec.

Mainframe capability

Working with large matrices efficiently requires fast access to large blocks of data, larger than normally available in 16 bit computers. A 400 x 400 matrix of floating point numbers, for example, requires a single block of 640,000 bytes of main memory.

The HP1000 computer systems have a unique feature called Extended Memory Area (EMA), that allows single blocks of data (matrices) as large as almost two million bytes to be specified without the need for special segmentation schemes. For a look at how EMA operates, see page 5.

Since vectors are arranged in memory in an orderly manner, the Vector Instruction Set can provide high speed access to matrices in the Extended Memory Area. The combination of VIS and EMA makes

32-BIT PERFORMANCE IN A 16-BIT MACHINE

Very large matrices will normally overflow the addressing capabilities of a computer that uses a 16-bit word, so that the machine either cannot perform the application or has to resort to disc memory, drastically slowing the performance.

The HP1000 with EMA and VIS overcomes this limitation on small machines at a fraction of the cost of a large mainframe. We ran a matrix comparison test between the 16-bit HP1000 F-Series computer with VIS and one of the fastest 32-bit computers on the market. Here are the results:

MATRIX INVERSION

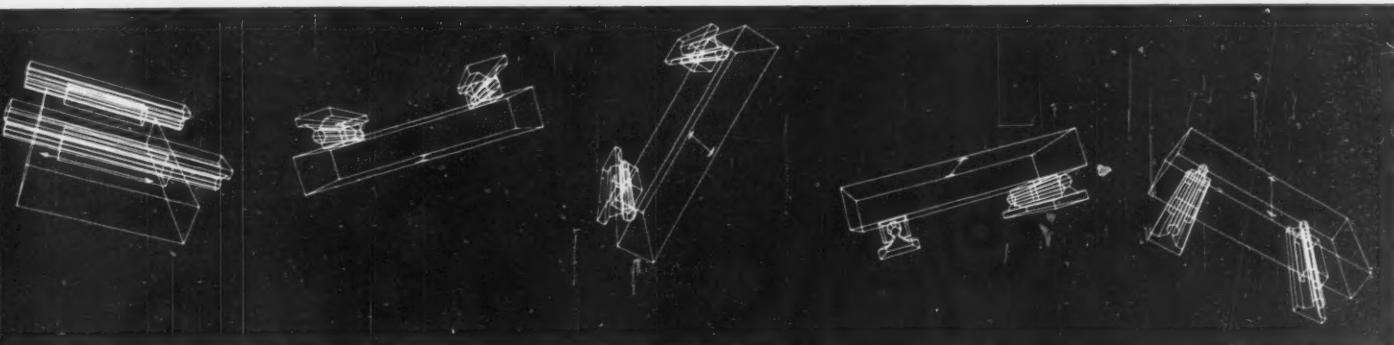
Matrix Size	F +VIS	32-bit computer
50x50	1.8 sec	1.5 sec
100x100	12.3 sec	11.7 sec
200x200*	105.0 sec	92.0 sec
400x400*	690.0 sec	720.0 sec

*EMA used

for a powerful matrix processing machine.

The chart on this page shows that the HP1000 F-Series with VIS can invert a 400 x 400 matrix of floating point numbers in 11 1/2 minutes. That's mainframe performance—at a fraction of the cost. The HP1000 F-Series is priced as low as \$13,750.

To learn more about matrix operations on the HP1000 F-Series, check A on the reply card.



Session Monitor slices time

The Session Monitor for the HP1000 computer series, part of the RTE-IVB operating system, allocates and protects system resources when the computer is accessed by many users for both real-time and session activity.

Functionally, the monitor is a layer of software above the operating system. Following criteria set by the system manager, the monitor:

- Controls and coordinates access to work-station instruments and system peripherals such as discs and line printers;
- Assigns CPU time according to predetermined program priorities.

Time for everything

With the Session Monitor, the HP1000 can support program development, data entry, data base query and similar jobs that are not time-critical, and at the same time be used to monitor real-time processes and respond to them.

Session Monitor allocates CPU time to different classes of users according to a priority schedule set up by the system manager. Session activities, which are not time-critical, can be carried out concurrently with real-time data capture and control functions, with no danger that the background sessions will interfere with time-critical functions. Session monitor is now included in RTE-IVB software package for the HP1000 computers.

Every 10-millisecond clock tick, and on device interrupts, the monitor scans the program list to make sure that the highest priority program is running. Real-time activities, such as data capture, time-critical controls, or external alarms, are handled by an absolute priority. The tasks are carried out to completion unless preempted by an activity with an even higher priority.

Session activities are time-sliced; they are placed in a queue that is logically circular, with one queue for each priority level. The "fence" between real-time and ses-

RTE IVB REAL TIME OPERATING SYSTEM WITH SESSION MONITOR

Program development

Batch processing

Data entry

Automatic test control

QUERY access to data base

External alarms

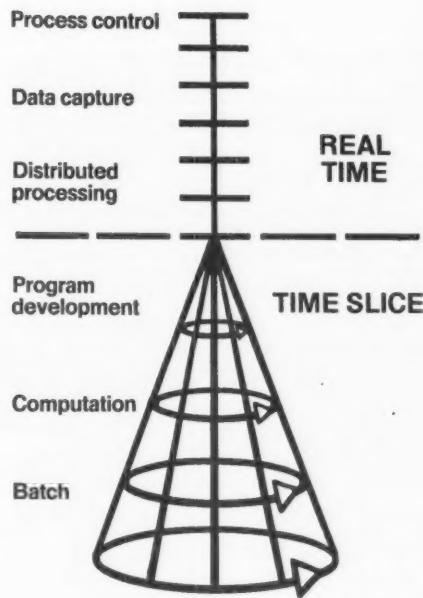
Network data processing

Time-critical controls

On-Line data capture

EMA:

*Virtual memory
in the central
processor*



This diagram shows how Session Monitor slices time both vertically and horizontally. Above a "fence" level selected by the system manager, programs execute strictly according to priority. Below the fence, programs share time as it becomes available. If six programs with equal priority are running, they each get a sixth of the CPU time allotted to that level.

sion activities is set by the system manager.

Schematically, the time-sliced layers resemble an inverted cone. The lower a program's priority, the lower its representation on the cone. Since the cone widens toward its base, low-priority programs get longer time slices when they are allocated CPU time. The slope of the cone's edge may be varied by the system manager.

Low overhead

By pre-setting priority levels, the system manager can load-balance the system without incurring the CPU overhead that accompanies

heuristic algorithms. The RTE-IVB operating system explicitly recognizes that the user knows more about system workload than a sophisticated algorithm can.

User devices are assigned according to a list attached to the log-on IC. The system keeps track of what instruments are being monitored at which stations, and keeps records of connect time and CPU time for each user. I/O and data storage devices may be designated by the system manager for particular users or groups of users, protecting files against unauthorized or accidental alteration by other users.

Tailor-made terminals

The monitor tailors an individual terminal to the needs of the person using it. A technician, for instance, may need no more than the ability to load data. A supervisor needs access to certain files to compile reports. A programmer can store new programs without worrying about their being changed or lost. The system manager can access the whole system and change it as needed.

RTE-IVB also provides spooling capability so that users can have access to peripheral devices, such as printers, without having to wait for the printing to be finished before continuing with other work.

In this way, the system ensures that the full capability of the HP1000 will be optimally distributed for the individual user's job mix.

Check B for literature on HP's RTE-IVB Session Monitor.

Through the use of the Extended Memory Area (EMA), the RTE-IVB operating system can put the entire two million-byte physical memory of the HP1000's central processing unit, less only space for the operating system and the user code, at the service of a single program.

EMA looks to the user very much like disc storage. Its data is not directly addressable, but must first be brought into the 32K-byte logical address space of the program. To do this, part of the EMA is used for a Memory Window Segment (MSEG) to map the location of desired data.

EMA is user-transparent, and is called through simple FORTRAN statements.

When an element located in EMA is called by a program, the segment containing the element is mapped into the logical address space. Because this mapping requires no disc swaps, EMA provides fast retrieval of random access data.

With a Vector Instruction Set (see pp. 2-3), the retrieval of elements of arrays and matrices can be faster, since a single mapping locates all desired data.

EMA can be made to run faster for specific applications by writing memory management routines. Many separate operations may be performed on the same EMA when a segmented program is used. One segment can read in data, a second can process it, and a third can store the result. Actual execution speeds depend on how much memory management the user wants to do.

HP 3000 Series 30: Compact computer power

Hewlett-Packard's proprietary silicon-on-sapphire technology has made it possible to introduce a new compact computer system that makes the HP3000 the right business computer family for an even wider range of users and applications.

The newest member of the family is the HP3000 Series 30, an SOS-based processor that performs all the functions of the larger Series 33 and Series III systems, including concurrent transaction processing, batch processing, data communications and program development. It's packaged in a small cabinet measuring only 24" by 36" by 18", accompanied by a separately packaged system/maintenance console and a system disc. Yet it costs under \$50,000.

SOS: An HP innovation

HP alone among computer manufacturers has developed SOS to the point where it can be used in commercially available products. For the user, SOS technology translates into small size, low power requirements, and high reliability in a general purpose machine.

The central processor unit (CPU) is designed around three SOS microprocessor chips containing the equivalent of 20,000 MOSFET transistors on one square inch of circuitry. Since devices on an SOS chip are dielectrically isolated, parasitic capacitance is dramatically reduced; the devices may be driven at relatively high speed—typically 2 nanosecond gate delays—on low power.

Putting most of the processor

logic on three chips means that fewer integrated circuit packages and fewer printed circuit boards are required for the system. Reducing the number of components directly improves system reliability.

Easy to install

Because of modest power requirements, the Series 30 does not require the classic raised-floor air-conditioned data center. When configured with the standard 20-megabyte disc drive, the Series 30 produces about 4,650 BTUs per hour—about the same amount of heat as a medium-sized copying machine.

I/O flexibility

SOS technology is also implemented in the input/output (I/O) circuitry of the Series 30, allowing for broad expansion of peripherals from a single card cage. Up to 32 asynchronous terminals may be attached, with four magnetic tape drives, eight disc drives (with a maximum of 960 megabytes disc storage), two line printers, and one flexible disc drive.

The Series 30 can now be networked with other members of the HP3000 family through HP's Distributed Systems Network (HP-DSN) architecture. With two communication lines, the Series 30 can configure 24 terminals, 4 magnetic tape drives, 8 disc drives, 2 line printers and 1 flexible disc.

"Hard" and "Soft" MPE

The Series 30 processor maintains compatibility with the proven HP3000 MPE III (Multiprogram-

ming Executive) operating system. Modular design of MPE means that only instructions that are hardware dependent ("hard" MPE, such as Input/Output and clock instructions) need differ on HP3000s that employ different I/O architectures and execution cycle times. The rest of MPE ("soft" MPE) is exactly common code on all of today's HP3000 systems. This allows common higher-level software: language compilers for COBOL, FORTRAN, RPG, SPL, and BASIC; applications tools for data base management (IMAGE/3000); English-like inquiry facility (QUERY/3000); and CRT-based forms management (HP VIEW/3000). Applications developed on any of today's HP3000s can be executed on any other family member without recompiling or relinking.

Thus, the Series 30 provides the business user with a general purpose machine having the same capabilities as the other members of the HP3000 family—the key differences between systems being price* and performance. This computer power can be put where the work is done: as terminals located throughout an organization linked to one computer, or as several computers located throughout the world and connected in a distributed network.

For the HP3000 Family story, check C on the reply card.

*Minimum configurations for HP3000 Series 30, 33 and III begin at \$49,750, \$58,500 and \$105,000, U.S. list, respectively.

Series III
High performance system
• 2Mb memory
• 16-64 terminals
• 9 data communication ports



HP3000 Family

MPE III
multiprogramming
operating system
& utilities

Programming languages

Data base
management system

Data base
inquiry language

Forms management
software

Data communications
software

All user-developed
application programs

Series 30
New entry
level system
• 1Mb memory
• 4-32 terminals
• 2 data communica-
tion ports

Where the need for
immediate access to
information is high
but must be provided
very economically,
the entry level Series
30 is ideal. It can
operate as a stand-
alone system or as
a station in a distrib-
uted processing
network performing
on-line order entry,
batch inventory
update, new appli-
cation development
and communications.

The INP: Housekeeper for busy CPUs

One of our newest SOS products is a front-end Intelligent Network Processor (INP) tailored for communications. Most of the data communications protocol handling is carried out by the INP; thus this load is removed from the CPU.

A data network manager wants programmers or analysts to be able to access remote data quickly, without degrading terminal response time for the rest of the on-line users. INP helps attain this goal by directing the flow of data.

Software off-loaded

The heart of the INP is a silicon-on-sapphire microprocessor, which generates BISYNC protocols from operating system software downloaded from the CPU when the communications line is opened. The protocols are stored in the INP's own 32K bytes of fast RAM, which is also used for data buffer-

ing. This memory, with automatic error detection, is made up of the same chips used in the HP3000's main memory.

Faster response time

When operating, the INP will interrupt the CPU only to report when a block of data has been transferred or received. The chart on this page shows how the INP can reduce CPU overhead; on a system that is heavily CPU-bound, this will result in faster response times at the terminal.

Other factors—I/O activity, amount of memory, number of users, and especially the nature of the particular application—will also affect response time. However, our tests show that on a system with a load of 30 sessions, the INP can reduce the effect of DS/3000 lines on response time by 80 percent.

The INP will also improve the

throughput of low-priority background batch jobs.

The fact that the protocol driver software is down-loaded from the CPU means that different communications protocols and subsystems may be accommodated in the future without adding new hardware.

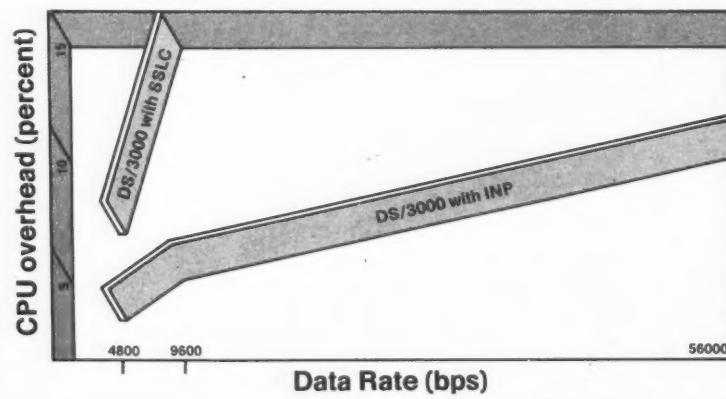
The INP will support data transfer rates to 19,200 bits per second using modems, or up to 56,000 bits/second hardwired or with a CCITT V.35 standard interface. In general, maximum data rates depend on the communications subsystem used and the hardware to which the INP is linked.

INP is the preferred data interface for new users of the HP3000 computers. It may be a cost-effective replacement for the present HP SSLC (Synchronous Single Line Controller) on existing systems that are CPU-bound.

Check D on the reply card for further details on the Intelligent Network Processor.

INP outperforms the synchronous single line controller (SSLC) on Distributed Systems 3000, the link to other HP systems.

DECREASING CPU OVERHEAD



Computer Advances is written to inform professionals of the latest technical contributions from Hewlett-Packard. You are invited to receive issues at your place of business or residence. Write Bob Ingols, Editor Computer Advances 19316 Pruneridge Ave Cupertino, CA 95014



**HEWLETT
PACKARD**

Hewlett-Packard Computer Advances

Hewlett-Packard Computer Advances

Direct Response Card

HP is pleased to provide you with literature or answer specific questions regarding any computer advances which intrigue you.

Send more Please
information contact

- A. HP1000F-Series with Vector Instruction Set
- B. HP92068A RTE-NBI Session Monitor
- C. HP300 Series 30 business computer
- D. HP3000 Family Intelligent Network Processor

HP is pleased to provide you with literature or answer specific questions regarding any computer advances which intrigue you.

Send more Please
information contact

- A. HP1000F-Series with Vector Instruction Set
- B. HP92068A RTE-NBI Session Monitor
- C. HP300 Series 30 business computer
- D. HP3000 Family Intelligent Network Processor

Name

Title

Company

Address

City

State or Province

Zip or Postal Code

Country

Telephone

Name

Title

Company

Address

City

State or Province

Zip or Postal Code

Country

Telephone

Computerworld

CW1279



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 141 CUPERTINO, CALIFORNIA
POSTAGE WILL BE PAID BY ADDRESSEE

Hewlett-Packard
Attn: Computer Advances
11000 Wolfe Road
Cupertino CA 95014



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 141 CUPERTINO, CALIFORNIA
POSTAGE WILL BE PAID BY ADDRESSEE

Hewlett-Packard
Attn: Computer Advances
11000 Wolfe Road
Cupertino CA 95014

Hewlett-Packard Computer Advances

MAINTENANCE!

The World of Software Maintenance, by Girish Parikh

From the author's forthcoming book *A Guide to Software Maintenance*. Copyright ©1979 by Girish Parikh. All rights reserved.

A Checklist for Potential Side Effects of a Maintenance Change, by Daniel P. Freedman and Gerald M. Weinberg

Structured Retrofit, by Jon C. Miller

Copyright ©1979 by Jon C. (Cris) Miller. All rights reserved.

Spare Parts Maintenance Strategy, by Tom Gilb

The World Of Software Maintenance

Whether you like maintenance or not, it's a fact of life in data processing. Someone, perhaps you, must do that dirty work — until the mess is cleared and replaced by more maintainable systems developed using structured technologies.

This article focuses on software maintenance as an important part of software engineering. It outlines different aspects of software maintenance and presents a case for collection and development of "software maintenance technologies."

Software engineering, simply defined, is a collection of methodologies, both technical and managerial, for development and maintenance of software. The word "maintenance" is used here in its broadest sense, including error corrections, changes (also called modifications or amendments), enhancements and improvements to the existing software.

The field of software engineering includes technical as well as managerial functions for the equally important functions of software development and software maintenance as shown in the figure.

The two branches (or functions) of software engineering — software development and software maintenance — can also be called "software development engineering" and "software maintenance engineering." However, the shorter terms are already in use, and it appears that their use will continue.

We can further divide software maintenance into "systems software maintenance" and "applications software maintenance." However, in this article, software maintenance includes both.

Software maintenance includes both

"structured software maintenance" and "unstructured software maintenance." We will take a closer look at them later.

(The term "unstructured software" is used here to represent the software developed without using structured tech-

The articles were excerpted from Techniques of Program and System Maintenance, edited by Girish Parikh, to be published by Ethnotech, Inc., P.O. Box 6627, Lincoln, Neb. 68506. The 300-page hard-bound book will be available early next year and may be ordered from the publisher for \$25.

nologies. However, the qualifying term "unstructured" might be misleading, since there is more of a continuum between the two polar extremes of structured and unstructured, and very little work is completely unstructured. The term, though imprecise, is used here, instead of "software developed without using structured technologies," since it seems that it is currently in use to represent such software.)

Neglected Topic

Traditionally, computing literature has focused on software development. Software maintenance has been largely neglected. This imbalance is like trying to fly with only one wing. (In recent programming literature, however, software maintenance has been receiving increased attention. See, for example, *High Level Cobol Programming*, by Gerald M. Weinberg et al, containing a whole chapter on maintenance, and *Techniques of Program Structure and Design* by Edward Yourdon.)

According to one study, about 45% of the overall hardware-software dollar is currently going into software maintenance. The same study further revealed that this number is likely to grow to about 60% by 1985 and is expected to continue to grow for a long time as we add new code to our inventory faster than we discard the old code. The ongoing maintenance, on which most programmers spend 50% — and sometimes 80% — of their time, is clearly a significant burden to users.

The proper use of structured techniques during software development can help produce more maintainable systems and programs, reducing the future burden of software maintenance. Such techniques include structured analysis, structured design and structured programming as well as productivity techniques such as top-down design, walkthroughs and team

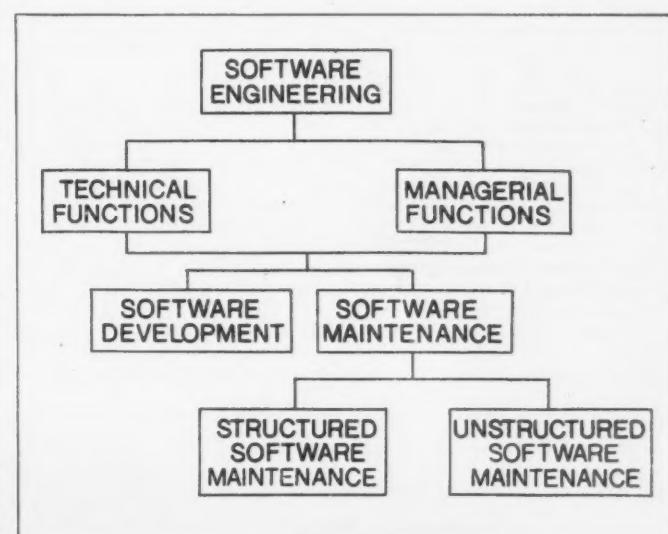
operations.

Software maintenance includes maintenance of all software including "structured software" (software developed using structured technologies), as well as "unstructured software" (software developed without using structured technologies).

The maintenance of structured software can be called "structured software maintenance" or simply "structured maintenance." However, the former term is preferable, as the latter is already used in connection with maintenance of unstructured software.

Ideally, structured software maintenance is a process of continued development. However, we do need techniques for structured software maintenance.

The current focus in software engineering is on new systems development. (Continued on *In Depth*/2)



Functions of Software Engineering

MAINTENANCE! IN DEPTH

In Depth/2

(Continued from *In Depth/1*)

ment. The systems developed using the structured technologies need techniques for structured implementation and maintenance. The objectives of these techniques are twofold: 1) minimization of the distinction between testing, integration and installation; and 2) preservation of the structural integrity of the initial systems design while doing maintenance.

The maintenance of unstructured software can be called "unstructured software maintenance" or simple "unstructured maintenance," but the former term is preferable.

Until unstructured software is given a partial or full "face lift" (described later) or is partially or completely rewritten using structured technologies, it may continue to be a major burden. The need for collecting (and even developing) techniques to handle such software maintenance is even greater than that of structured software.

While many techniques may be different for the two kinds of software maintenance, it is likely that some techniques are common to both. For example, the techniques for a face lift can also be applied to structured software.

The maintainability of unstructured

software can vary in degrees from easily maintainable to almost unmaintainable. Several factors such as the structure of the unstructured software, the quality of available documentation, the experience and application knowledge of maintenance programmers, the extensiveness and types of maintenance and management's attitude should be considered in estimating the maintainability of software.

Again, maintainability may be relative to the criteria established, and it may vary for different components of the same software package.

Types of Maintenance

Maintenance can be classified into three types: "corrective maintenance" to take care of processing, performance or implementation failures; "adaptive maintenance" to satisfy changes in the processing or data environment; and "perfective maintenance" for enhancing performance or maintainability.

Little has been written on the "how-to" aspects of unstructured software maintenance. Nevertheless, while each such system may have its own problems, some common techniques, based on experience and study, can be collected and/or developed.

Some of the structured philosophy, such as use of a human librarian, walkthroughs and chief programmer teams, can be applied to maintain unstructured software.

Software 'Face Lifts'

Software "face lift" techniques essentially improve the appearance of software. Reformatting of programs (which can be automated) may dramatically improve maintenance programming productivity.

The restructuring of programs (possibly automated) can also increase maintenance programming productivity; however, it may have limitations depending on the structure of the original software.

Available software packages, such as automated libraries, preprocessors including reformatting packages and structuring engines, file compare utilities and on-line testing and debugging packages, can be efficiently used to increase maintenance programming productivity. This subject needs to be explored.

A Checklist: Potential Side Effects

Over the years, we've accumulated many cases of "side effects" — unanticipated and usually undesired effects that were triggered by changing "just one thing." We've gathered all these things in the checklist given below.

Because the list gathers material from many installations, systems and programming languages, not all items will be applicable to your situation. To use the list, have several knowledgeable people sit down in a review, making sure that they understand each item, that inapplicable items are deleted, that applicable items are tailored to your situation and that any omitted items are added.

Once the list has been tailored to your installation's needs, you may begin to use it in maintenance inspections. Merely inspect the proposed change for each type of side effect in succession. If the change passes this inspection, it's very likely to work correctly the first time on the machine — and not to cause any side effects.

For convenience, the side effects have been divided into four categories: code, data, documentation and miscellaneous. Don't worry too much about classification, though. It doesn't hurt to catch the same problem under two different categories, but it sure hurts to miss it because of a jurisdictional dispute.

Code Side Effects

Generally, code side effects are the most dramatic, though for that reason they may be detected and corrected earlier. Many of these potential side effects can be caught by a good compiler, perhaps with the aid of the linkage editor and/or operating system.

You'll be better off, though, to catch most of them before compiling, since maintenance changes often require huge compilations, within which error

or warning messages are often missed.

1. New error message. If you do make a compilation, make sure that no new messages are issued and no old ones are changed or deleted unless that was the purpose of the change.

2. Active label deleted. The deleted portion of code may have contained a label branched to from elsewhere. Compiler or cross-reference should spot this, but it's an easy manual check to trace back all deleted labels.

3. Active subroutine deleted. The deleted portion of code may have contained a performed paragraph or a closed internal subroutine which is executed from elsewhere. This should be caught by compiler if hand check misses it.

4. Active macro deleted. The deleted portion of code may have contained a macro definition used to expand code elsewhere. Under some systems, this would not be caught automatically if the name of the macro is a legal default name, leaving code with a valid interpretation of the unexpanded form.

5. Active label changed. Instead of deleting a label referenced elsewhere, the change may have placed the label in a slightly different position, or changed the code following that label which would be executed after a branch to the label. (Note that without GOTOs, these label problems can be controlled.)

6. Active subroutine changed. A closed subroutine or executed paragraph invoked from elsewhere may have been changed. The cross-reference list should be used to check for this and the label possibility (point 5).

7. Active macro changed. Any change, no matter how slight, to a macro definition can cause arbitrary amounts of trouble if that macro is used in a different context. Cross-reference listings may not identify all places the macro is invoked.

A macro listing from the previous compilation might help — otherwise a hand check of the source code (before macro expansion) must be made. If this list is not available, get a straight listing of the program source code.

8. Changed function. Any function whose line of execution passes through the changed statement could be changed. Walk through each different function that passes through the changed code, checking that the input and output state are as they should be in the new code.

9. Timing relationships. If the speed of execution changes — either faster or slower — and there are any time-dependent operations, the change could cause you trouble. It's best not to have time-dependent code, but sometimes there's no way out. Remember that it's not just slower code that causes trouble of this type.

10. Efficiency. Although the code may be time independent, your budget may not be. All functions that pass through the affected code must be checked for important speed changes that might hurt your computing budget or performance of the entire pro-

IN DATA COMMUNICATIONS, NEARLY ALL THE KEY PEOPLE READ THE HIRSCH REPORT. MAKE IT UNANIMOUS. ORDER YOUR COPY NOW. IT'S FREE.

If you develop/market datacom products/services, *The Hirsch Report* is must reading for you because it analyzes emerging datacom technology and government regulatory policies. Each issue of *The Hirsch Report* covers a single topic, in depth, and includes information as well as insights you won't find in any other publication.

Published every other month, *The Hirsch Report* is written by Phil Hirsch, a journalist who has covered every major data com-

munications development in the United States and Europe since 1965. Phil is currently a Senior Writer at *Computerworld*. Previously, he was a telecommunications policy consultant to the U.S. Congress.

Read *The Hirsch Report* free and decide for yourself whether to subscribe. There is no obligation. Just fill out the coupon below and return it in the *Computerworld* circulation envelope elsewhere in this issue.

The January, March, and September '79 *Hirsch Reports* provided in-depth analyses of Videotext/Teletext services; the May and July '79 Reports covered pending changes in the Communications Act of 1934. To obtain either series of reports free and without obligation, just fill in the coupon below and return it to: *Hirsch Report*, C/O CW Communications Circulation, 797 Washington St., Newton, MA. 02160

Please send me the *Hirsch Reports* on:

Videotext/Teletext

Rewrite of the Communications Act of 1934

I don't need your free offer. Just enter my subscription at \$80/year and bill me.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

IN DEPTH

gram. Don't just check the function you're changing.

11. Access arm contention. When timing relationships are changed, new files are added or file characteristics are changed, the result can be increased access arm contention on movable arm disk files. The function may be exactly the same, but total elapsed processing time can be raised by huge factors — 100 times or even more.

12. Memory usage. If the change requires more primary storage, it may push that part of the code over its allocated memory, resulting in an error.

13. Memory layout. Even if memory usage decreases, the change may affect the layout of other parts of the program. If the original program was correct and relocatable, this change shouldn't affect it, but the original might not have been entirely correct.

For instance, a data word was uninitialized in the original, but happened to fall on a word left zero by the loader. Deleting one word earlier in the program caused the uninitialized word to be laid over a nonzero word, causing the program to fail. The error was, of course, in the original, but wasn't manifest until the "foolproof" change.

14. Virtual behavior. Any change in core layout, no matter how small, could have an effect on the paging behavior of the program, resulting in a surprising and perhaps unacceptable change in efficiency or elapsed time. For example, pushing just one instruction over a page boundary (and it need not be anywhere near the changes) can double or triple the amount of paging experienced by a program.

So large an effect is rare and unpredictable, so you'd better be prepared to ask if it would be possible and to check for it in the first executions.

15. Invocation count change. Certain subroutines, including system subroutines for handling I/O and other system functions, keep a count of the number of times they are invoked. This count may be used to control messages, priority, system aborts and other functions. If you change the number of times a routine is entered — either increasing or decreasing — the invocation count will change and could cause side effects.

16. Change of priority. In some operating systems, priority can be lowered and/or raised dynamically by the application program or by the operating system if the program behaves in certain ways. Such a priority change could be triggered by a small change in program size or perhaps a change in the pattern of calling some system routines, resulting in vastly altered operating times.

17. File opening. By opening a file at a different point in a program, we may accidentally give a file different characteristics. For instance, in PL/I an implicit opening can be caused by many file operations, with each operation giving different attributes. Explicit opening before first use prevents this problem, but not all programs in maintenance have followed this safe practice.

18. File closing. The program may cause trouble if it closes or causes a file to close that was open previously. This problem cannot be so easily prevented as the file opening problem. It depends, instead, on a discipline of each programmer to avoid any closing before the last possible use.

19. On unit change. In PL/I and other languages that provide for interrupts, a program change could change the "active ON UNIT" — that is, the action to be taken in case of a particu-

lar interrupt. Such a change could affect any following process that may expect to be interrupted.

20. Interrupt mask change. In systems with interrupts, certain interrupts can be "enabled" and "disabled" by program action. If a change modifies the "mask" governing enabling and disabling, any subsequent process can be affected. There can be an interrupt which was previously disabled, or a previously enabled interrupt may not be "masked."

Data side effects can be very subtle and related to the actual change in the most oblique ways. Many data side effects lie unnoticed for weeks or months after a change, until some user gets a funny feeling about what's happening to the output. The savings to be gained from finding data side effects in a review before they happen are, therefore, potentially enormous.

1. Flag change. If the change modifies the state of a flag, or deletes the

(Continued on *In Depth/4*)



Process data...Process words

You can do both with Mohawk Data Sciences Series 21 distributed information systems. That's why they're among the fastest-selling in the industry. Smart buyers all over the world realize that many of the features of the office of tomorrow are here today...with Series 21 systems.

For distributed processing, Series 21 systems offer a basketful of features. They're easy to install and simple to operate. They have big clear screens and touch-typing keyboards. And they handle almost any remote site application...order entry, invoicing, inventory control, plant scheduling, payroll preparation, labor distribution, personnel records...the list is endless.

Plus full word processing capability. With Series 21 systems, you

get all the up-to-the-minute features needed to electronically create and edit your business documents—letters, reports, proposals, manuscripts. Repetitive typing is eliminated. Error correction is fast and simple. And, of course, you get picture-perfect printing of finished texts.

Learn more about the double-duty Series 21 systems from MDS...the company that sells and services its systems in 50 countries throughout the world. Fill out and mail coupon today.

PLEASE FORWARD MORE INFORMATION ON THE MDS SERIES 21 AND WORD PROCESSING

Name _____ Title _____

Company _____

Address _____

Zip _____

Phone _____

CW 121079

Series 21 is a trademark of Mohawk Data Sciences

MDS MOHAWK DATA SCIENCES

1599 Littleton Road, Parsippany, N.J. 07054
(201) 540-9080

MAINTENANCE!

IN DEPTH

In Depth/4

(Continued from *In Depth/3*)
modification of a previously modified flag, or changes the conditions under which a flag is modified, any part of the program that accesses that flag could be affected.

2. Condition change. In languages such as Cobol which have named conditions, changing a data item's value could change a condition which doesn't seem to have any obvious relationship, according to its name. Check all conditions that are based on any data item changed by the program.

3. Data value change. Any time a data item is used in more than one place, any change to that item could cause problems with any process that accesses it. Use the cross-reference listing to indicate potentially changed processes.

4. Changed allocation. When dynamic storage allocation is used, any change that allocates or deallocates storage could affect another part of the program.

For instance, if an extra item is put on a stack, the stack count in other places could be out of synchronization, perhaps leaving one item unprocessed. If an item is deleted, a system error might result when the stack empties too soon. Also, the total allocation might

become too large, dynamically, if additional allocations are made by the changed code.

5. Overlay change. When various data areas are overlaid, the chances for side effects escalate. Avoid overlaying whenever possible. Where it must be done, or has been done, check each and every name under which the same storage can be accessed or changed.

6. Parameter change. If a subroutine is changed, and if that subroutine now changes some parameter passed to it by reference, the calling routine can be devastated.

In Fortran, for instance, the called routine can even change "constants." Search out all references to parameters and eliminate such changes if possible, but be sure to check out all that can't be eliminated.

7. File position change. If a sequential file is read or written, or was formerly read or written, by the changed code, any change in the number of reads or writes, or in any other file positioning actions, could disturb the behavior of other regions of code. Even on a print file, an extra line could cause disruption of line counts or break up a previously contiguous group of output lines.

8. Invalid pointer. Whenever data

structures are linked together by pointers, certain operations on the pointer itself are not, of course, side effects, but operations on the referenced material may affect the pointer in hidden ways. If the number of items in a table is changed, the pointer to the last element may not be updated, or the table count may not reflect the change. Even moving an item, within core or back and forth to a backing store, can render pointers invalid.

9. Record layout changes. Expanding, contracting or deleting a field in a record can change the definitions of other fields, which in turn can disrupt other programs that reference those fields or other parts of the same program.

In higher level languages, recompilations may be required, but these do not always automatically correct the problem. In some data base systems, the change of physical record layout is "transparent" to the user programs — except for possible efficiency considerations or bugs in the data base system.

10. Security alterations. In some operating systems, files and data bases can be protected with some access control scheme. If the scheme is dynamic, any change to the security level or interlock pattern could have effects on other portions of the same portion or on other programs operating in parallel.

Documentation Side Effects

Probably the most frequent side effect of maintenance changes is the corruption of the existing documentation. The programs change and yet the documentation remains the same. Even when an effort is made to update the documentation, subtle points are overlooked in the rush to production.

Eventually, the accumulation of small errors in the documentation produces documents nobody can rely on. After that, nothing short of major effort to rewrite can restore the documentation to usefulness. Only by systematic review of the impact of each change on all documentation can we keep the documentation current and useful.

1. New name. When a new data name, file name or label is created, it must be posted to all reference lists. The newest names are the ones most likely to be sought in the documentation, yet are the least likely to be found there.

2. Old name deleted. When an old name is no longer used, it should be deleted from all appearances in the documentation. If the documents are not well indexed, it may prove difficult to locate all references. Eventually, old names accumulate in a document, cause confusion and slow down the use of that document.

An excellent practice is to create a section of the document called "formerly used names." These names are kept in the index as well so that anyone running across a leftover name can immediately find out that the name is no longer in use. The list of formerly used names can also be helpful in

avoiding the use of names recently in use, which may prove confusing.

3. Invalid index. When pages are added to or deleted from a document, the index may be rendered invalid. Without automatic production of the index which updates all later page references, such an index becomes worse than useless. It becomes misleading.

One method of keeping the index valid is to use fractional page numbers for inserts. This postpones the problem of updating the index until the pages are renumbered but then makes the job practically impossible without starting over. Also, any indexable items in the insert must be referenced — to the fractional page numbers.

This kind of updating seems, at the time, to be a real pain in the neck, but if you aren't going to do it, then get rid of the document altogether.

4. Invalid table of contents. When sections are added or deleted, the table of contents become invalid. Usually, all this requires is a retyping of a page or two. Don't make the mistake, however, of thinking that the table of contents is the only reference list that must be updated. In general, especially for large documents, the index is a far more important starting point for information searches.

5. New message error. Of all the error messages, the newest are the ones most likely to be encountered in all use of the system, yet they are the least likely to be found in the message reference manual. "Self-documenting messages" are one solution to this problem, but few systems are willing to devote sufficient storage or time to make messages truly self-documenting.

The best way to make sure that messages get into the message documentation is to have an automatic way of updating that documentation. Even then, the reviewers need to check that the programmer has taken the trouble to activate the update.

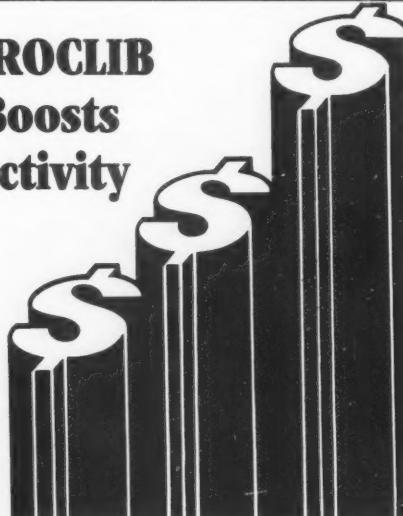
6. Deleted message error. It's not usually too serious if we forget to delete the documentation for a deleted error message. Nevertheless, it's good to keep things tidy and to prevent the documentation from growing too large. Also, keep a list of previous error messages so they won't be reused. There often are copies of documentation lying around which would give a user the wrong interpretation of the new message under the old name.

7. Error message meaning changed. Old copies of documentation make it very difficult to "spread the word" when an existing message changes meaning, even if the master documentation is updated.

The review group will want to question any change of meaning or addition of new meaning to an existing error message. Usually it's best to create a new message to handle the new case. Any cost in machine resources is quickly recovered by benefiting the otherwise puzzled users.

8. Operator response changes. All the same arguments we've given about error messages apply to operator responses. In addition, if new operator

JOBLIB/PROCLIB Analysis Boosts OS Productivity



Want to simplify scheduling? Cut resource conflicts? Move new systems from test to production faster? Use your most informative, least used libraries to analyze your current environment.

Chicago Data Systems' JOB/PROC software provides x-ref information on Programs, Data Sets, Jobs, Sysout Forms and Region Size. Lets you measure impact of production changes before you make them. Even facilitates DOS to OS conversions.

Lease—\$195/Month (IMS/VS \$220) or one time license fee. • 30 Day FREE Trial
CALL (312) 325-2960

CHICAGO DATA SYSTEMS, INC.

2805 Butterfield Road • Oakbrook, IL 60521

responses give the operator more power, it's usually a good idea to provide training. Otherwise, the operators tend to continue as always, ignoring the new and improved ways of doing things. The review group should ask, "How will the operators learn to use these new features?"

9. Accepts new data. When input routines are modified to be more forgiving or to accept previously forbidden forms of input, failure to document and train can wipe out the value of the changes. The review group must once again ask, "How are these new features communicated to the people who prepare the input?"

10. Rejects old data. When acceptable ranges of input are narrowed, the users will ordinarily find out, even if the changes are not documented, when they try to use previously acceptable inputs. Nevertheless, their attempts to get the system to accept this data will prove costly and annoying unless they are informed in advance of the changes.

11. New data interpretation. When previously acceptable input is now accepted under a different interpretation, users will make costly mistakes unless they are most carefully and thoroughly prepared for the changes. It will generally be best for the review group to question a design that changes the interpretation of existing inputs, rather than incur the costs of dumping such a design on the users, no matter how carefully they are prepared.

Miscellaneous Side Effects

Rather than debating the classification of a particular side effect you encounter, add it to this list of miscellaneous side effects.

1. Clerical procedures. Take the time to review what effects will result before and after the computer portion of the processing. For instance, incorporating more information in a report may eliminate or change clerical operations that previously had to be performed before the former report was used. Although these shortcuts may seem completely advantageous, any changes in clerical procedures can initially be expected to lead to errors unless specific provision is made to retain those people performing the operations.

2. Forms. Changes may require new forms or new interpretations of old ones. In the first case, form printing may be the longest lead time item in the design — and the existence of a five-year supply of old forms may generate resistance to the new system. In both cases, the review group had better check that the system will provide some information along with the first new outputs, so that users understand the new material.

3. Impact on other systems. In one case, a maintenance change increased the amount of six-part output from an insignificant few pages to a major portion of the inventory. When it came to run the other systems using six-part paper, the stock was quickly depleted. There's no end to such subtle effects

and no way to guarantee that all of them are caught in a review. It never hurts, though, for the review group to take a few minutes and brainstorm regarding what areas may have been overlooked. Keep track of all cases that occur, and eventually you'll have a pretty effective checklist, including such items as:

- Use of a shared forms inventory.
- Shared forms resources.
- Skilled personnel needed by two systems.

- Scheduling conflicts.
- Telephone or communications line loading.
- Exclusive use of lines.
- Competition for auxiliary equipment or services, such as bursters, delivery carts and storage space.

4. Job control. Many program changes require associated job control changes. Such changes are obviously part of the "side effects" of any maintenance change. Less obvious are the changes that make the job control pro-

cedures less efficient, though still valid.

The review group must check that the previous job control is still the best for the modified system. Will there be inefficiencies? Will operating procedures become less convenient? Can we take advantage of the change to bring the system more in line with present operational standards or with newly available equipment?

5. Expectations. One of the most

(Continued on *In Depth/6*)

SYSTEM 2000 MAKES EXCEPTIONALLY GOOD CENTS.

Today. Tomorrow. Data base management with SYSTEM 2000 makes it possible for you to do more without spending more. We call it centsible—so do our customers.

For example, Texas State Comptroller Bob Bullock's office is using SYSTEM 2000 to assist in recovering hundreds of thousands of dollars in delinquent taxes. (They very cleverly tied together their tax administration and statewide accounting systems with a SYSTEM 2000 data base.)

Some forward-thinking people at a leading manufacturer of nuclear pumps used SYSTEM 2000 to attack problems in inventory, purchasing, and quality control. As a result, they helped management increase the company's return on investment by increasing the turn on inventory. They solved in six weeks the purchasing problem that the company had been trying to solve with traditional methods for two years. They implemented a very thorough quality control program and a lot of other outstanding, cost-effective applications to make the company more efficient. More importantly, SYSTEM 2000 gave them the ability to expand these applications into their worldwide operations with only a very small increase in staff at the central site. And as for those central

site staff members, their productivity—when compared to traditional methods—increased three to four fold! That's centsible.

There's still more. NASA is saving time and money in their space shuttle program by having SYSTEM 2000 handle tedious projects such as inventory control, problem reporting, documentation control, and other tasks which previously were labor intensive, cumbersome and inefficient.

Seven years ago, Ford Motor Company's Ford Parts and Service Division installed SYSTEM 2000 to track packaging specs and bill of materials information for over 200,000 different types of parts. (These parts are stored in the Ford Parts Distribution Center which has over 3,000,000 sq. ft. of warehouse space and in 21 Ford Parts Distribution Centers which have 6,100,000 sq. ft. and are strategically located throughout the United States.)

Imagine how incredibly costly and inefficient this would have been under the old paper file method!

These are just a few of our centsible customers. We'd like to tell you about the others and what SYSTEM 2000 can do for you. Just send in the coupon—we'll be right back with a penny for our thoughts.



THE CENTSIBLE DATA BASE MANAGEMENT COMPANY



Yes, tell me about being centsible with SYSTEM 2000.

Send literature. I'm in a hurry—have someone call me.

Attach your business card and mail to
MRI SYSTEMS CORPORATION
P. O. Box 9968
Austin, Texas 78766
(512) 258-5171

A SUBSIDIARY OF intel

MAINTENANCE! IN DEPTH

In Depth/6

(Continued from *In Depth/5*) frequently overlooked side effects is the effect of a modification on what people think. The announcement of a change may make the users prepare themselves (perhaps wisely) for a rash of errors. On the other hand, the announcement of one change may lead them (foolishly) to expect that other changes will naturally accompany it or soon follow.

The net result of an "improvement" is often a mob of even less satisfied users, so the review group ought to speculate on what will happen when this change encounters the wooly world of the human psyche.

6. **Success.** In the past, maintenance has been so fraught with side ef-

fect dangers and just plain errors that success was seldom achieved. Once our maintenance reviews are in full swing, however, we have to anticipate that we will in fact succeed once in a while — and we must also anticipate what that success will bring.

For instance, one error-riddled system was seldom used by its several hundred potential users, so management decided to mount an effort to have the system repaired in a systematic fashion. The resulting system was so dependable and useful that usage suddenly increased by a factor of 1,000 over previous usage. This increase in transaction volume made the file design of the system completely inadequate to the daily load — which soon

meant that nobody could get results fast enough to be useful.

The entire problem and so many others like it could have been avoided if the review group had only considered that unavoidable law of nature: success breeds failure. So, just when your maintenance reviews start to pay off, be prepared for the inevitable reaction. If you start making systems better, your users will want more of the same — the best side effect of all.

Structured Retrofit

The structured methodologies are now fairly well accepted for new systems development, although there are differences in interpretation from installation to installation. Their use has rarely been considered, and almost never accepted, in a maintenance environment. "Structured retrofit" is the application of today's methodologies to yesterday's systems in order to support tomorrow's requirements.

The typical DP department spends more than half its staff on maintenance coding, maintenance compilations and maintenance testing. What is needed is a departmental strategy which improves the probabilities of quick satisfaction of random requests for maintenance, reduction in the number of programs designated incapable of cost-effective maintenance and increases in the numbers of programs capable of supporting major enhancements without rewrites and extensive testing.

Consider creating a task force using the following elements in a maintenance support capacity:

- A chief programmer.
- A librarian and development support libraries.

- Programmer/analysts.
- Top-down design.
- Structured walk-throughs.
- Structured programming.

The chief programmer leads the task force in seeking out candidate systems for structured retrofit. In advance, the team must have some scoring system for rating candidates.

The system should include both subjective input from users and managers and objective data from the program's log. In this latter category, include the age of the program, the number of changes applied since its inception and the time since last changed.

Each team member conducts some research and presents the results to task force members in a walk-through fashion, as a basis for proceeding on program changes. Once the high-payoff candidates have been identified, the team members proceed to the next level of research, to be followed by another walk-through before making any changes to program code.

Priorities for Change

The priorities for changes within a program are:

1. Standardization of visual properties (indentation, naming conventions and paragraph prefixing, in particular).

2. Use of libraries for interprogram communication (principally for record formats and standard formulas and algorithms).

3. Isolation of I/O routines, with record counts, from in-line processing to one PERFORMable routine per file.

4. Elimination of PERFORM, GO-TO and ALTER ambiguities, uncertainties and control pathology.

5. Elimination of overlapping PERFORM THRUs and restriction of any residual THRUs to EXIT paragraphs.

6. Optimization (mechanically) of compiled code to improve program throughput.

7. Flowcharting (mechanically). The validation mechanism is a file-to-file compare utility, which may be applied at any time. There is no need to complete all retrofit items, but merely to proceed as far as is cost-effective and time-effective. The methodology allows for resumption of retrofit activities at any time that its score on the priority system rises, from information supplied outside the task force.

There is one cardinal restriction: No member of the task force is authorized to make any change to eliminate any revealed error or to satisfy a request for program enhancement. This restriction eliminates time lost to user negotiation and ensures that there is always a fall-back point, should the file-to-file compare utility reveal any insoluble problem. It also protects the user from losing an audit trail. The task force members do, of course, record any apparent bugs for review and authorized correction by the normal maintenance group.

The librarian, as in a development team, is the focal point of proven

(Continued on *In Depth/8*)

dc
dearborn
computer company

Giveth
excellent lease rates on 360, 370, 303X, 4000
and all peripherals.

Taketh
your excess equipment in trade, or purchase lease-back.

Looketh
to buy and sell IBM and IBM compatible computer equipment.

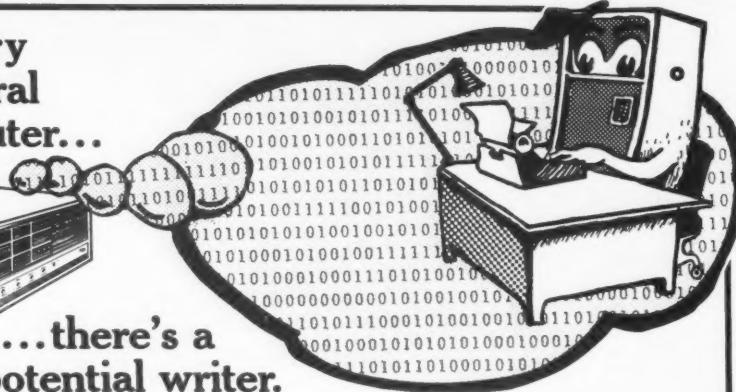
Brokers and Dealers Only: Bridge financing available.
Contact Mr. Ira Levy, Park Ridge, 312/827-9200.

dc **dearborn**
computer company

1460 renaissance drive/suite 400/park ridge, illinois 60068 (chicago)
(312) 827-9200/telex: 28-3561

CA

Inside every Data General minicomputer...



...there's a potential writer.

TIPS — a Text Information Processing System — can turn your ECLIPSE®, NOVA®, or microNOVA® computer into a full-blown word processing system. TIPS runs under AOS, RDOS, and DOS and provides all the features of a sophisticated stand-alone word processor for only a fraction of the price.

If you'd like a personal demonstration on your

DataGeneral system or simply desire more information, give us a call. After all, why hold back an aspiring writer?

Information Processing Techniques Corporation
1070 East Meadow Circle
Palo Alto, California 94303
415/494-3211

TIPS—Word Processing for Data General Systems

ECLIPSE, NOVA and microNOVA are trademarks owned by DataGeneral Corporation.



129 reasons to buy the new Perkin-Elmer 3220 supermini.

You can build an ultra-high-performance, 128-terminal system on Perkin-Elmer's powerful new 32-bit Model 3220. That's 128 good reasons.

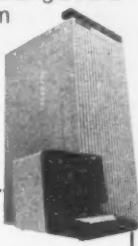
The 129th reason is our RELIANCE software—the transaction processing package that makes it all possible. The instantaneous terminal response. The ability to handle a variety of complex operations all at once. The unmatched throughput for a massive number of transactions. Even with all this power, a RELIANCE system is easy to operate.

RELIANCE integrates COBOL, data management, and transaction processing software. It's explicitly designed to deliver the reliability, integrity, and security so critical to applications requiring large amounts of on-line file processing. And RELIANCE protects your commercial data base from media faults and system failures.

Your application programmers can do all their development work, batch or transaction processing, in COBOL. With its enforced modular structure and built-in recovery routines, RELIANCE makes it easier to write, implement, and modify application programs.

The Perkin-Elmer Model 3220 is a supermini with built-in growth. Its memory can expand to meet the broadest system requirements. What's more, the low starting price of \$33,500 (U.S. only) is subject to OEM terms and conditions unmatched in the industry. Get all the reasons for building a transaction processing system with the 3220 and RELIANCE.

Simply mail the coupon or call toll-free 800-631-2154. In NJ (201) 229-6800.



Perkin-Elmer
Oceanport, NJ 07757

Please send me your fact file
on the 3220 and RELIANCE.

Name

Title

Tel.

Company

Street

City

State

Zip

CW 1210

PERKIN-ELMER

MAINTENANCE! IN DEPTH

In Depth/8

(Continued from In Depth/6)
achievement, controlling the retrofit log, the test data used to validate the retrofit and the mechanized documentation (library materials, flowcharts and program listings). All migrate back to the normal maintenance area. The librarian may also have the task of researching the literature and marketing materials to find tools to speed up the retrofit activity.

This article merely introduces the idea of a task force in a maintenance support function. It offers no objective data to support its position. However, I contend that existing software packages (library systems, convention-enforcing programs, the SORT verb, report writers, structuring engines and object code optimizers as well as flowcharts) provide adequate tools for cost-effective retrofit.

In closing, simply consider the potential savings from extending the mean time between conversion by months, years or even decades by having code which can be reliably modified instead of scrapped. Remember that most code scrapped covers conditions undocumented in the old system and forgotten in the specifications for its successor.

Spare Parts Maintenance Strategy

You are responsible for the on-line project or its maintenance. When the inevitable system breakdowns occur because of program bugs, you know that it is important to all users of the system that the programming team can diagnose the source of the error, correct it and retest the entire system. Then, at the end of two to 20 hours, with luck, you can put the "real-time" system back on the air again. With the best available technology and a lot of luck, this will only happen once a week or once a month.

I know this will sound incredible, but I recently received technical papers

from software specialists who are responsible for the safety system of atomic power plants. They clearly thought that the solution to their reliability and maintenance problems was through structured programming. Antipollution forces take note!

Needless to say, in panic (my own life was at stake) I offered to visit them at my own expense and set them straight. I am much relieved to say they accepted, and part of what I told them is the idea below.

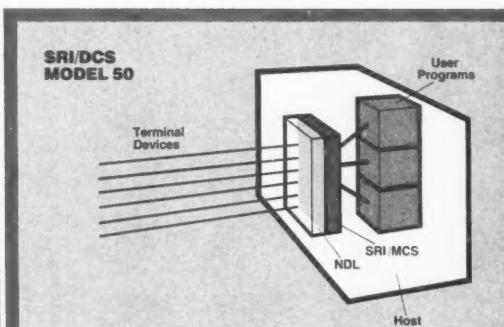
The basic idea is very simple. Write two programs to perform the *same* function. One acts as a spare part for the other. The basic assumption is that both are well tested and that whenever a bug does occur in one of the program versions, then exactly the same bug will not usually be present in the spare-part version.

We do this with computer hardware and with the software known as "files," and if you think about it, we have actually been practicing this tech-

nology on a wide scale with programs for years. You don't believe me, do you?

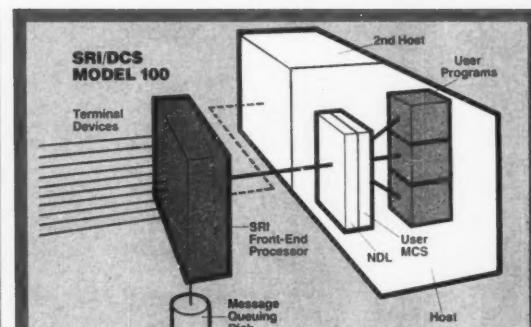
Think about what a systems programmer does when he unexpectedly encounters a bug in the new update of the supplier's software. He goes back to the spare part with different bugs, the old version. Similarly, when converting to new programming languages on the same system, we are naturally prepared to revert to the old version (even if it does run slower and

Now, On-Line Alternatives for Burroughs Medium Systems Users



HOST RESIDENT MESSAGE CONTROL SOFTWARE

This software system interfaces with Burroughs NDL; but it provides a message control system that goes far beyond conventional NDL by adding features for system access and security control, audit/recovery, transaction definition, remote print control, and centralized CRT forms maintenance and service routines. Want more? There are many more features in this exceptional software package. Quickly, easily and inexpensively installed, SRI/DCS Model 50 is an excellent foundation for the emerging on-line shop. And, if you need to add a front-end processor, expansion options are available.



A HIGH-PERFORMANCE FRONT-END FOR THE NDL USER

This powerful front-end communications processor is targeted to meet the needs of Medium Systems NDL users. Providing a combined data rate in excess of 20,000 CPS, SRI/DCS Model 100 will support large and active networks while dramatically reducing the mainframe resources consumed by NDL. The Model 100 is an easy way to add communications flexibility and performance, including a wide range of terminal and protocol support, simultaneous dual host service, up to 128 low-speed or 26 high-speed data communications ports, and optional front-end message queuing. Easily and quickly installed, SRI/DCS Model 100 can be the answer to your data comm problems.

DOS

CONVERTS DOS COBOL
AND JCL TO OS

FOCUS

AUTOMATICALLY...QUICKLY...
ACCURATELY...INEXPENSIVELY

OS

ARKAY COMPUTER INC.
24 MANOR HOUSE ROAD
NEWTON, MA 02159
(617) 964-1894

Ask for specific recommendations for your needs

Model recommendations — SRI technical and sales personnel will bring to bear a breadth of on-line processing experience to work with you in analyzing and forecasting your network needs ... to select the most appropriate entry point into the SRI/DCS product line.

Availability — Typical delivery time is between 10 and 14 weeks, with training preceding installation.

Service — Hewlett-Packard's nationwide service organization supports all front-end processor hardware. SRI services and supports firmware and software.

is less portable) when we hit unexpected bugs on the recently coded version.

So in fact, what I am talking about is making conscious use of the concept of spare part programs when planning a new system. The most immediate objection is cost. However, before you discard the idea on cost grounds, ask yourself whether the dual computer systems you have planned (for graceful degradation to one of the CPUs when the other fails) is really well

planned.

Half the breakdown causes are related to hardware, but half of them are from software, including user-written programs. Is it really consistent economics to buy hardware spares and not to buy software spares? The myth that programs don't break down ("once they are right") — and therefore need no spare parts — is difficult to break down, because the people who believe it have not been listening to the widespread experience in the software

field which tell their clear story.

Software is as error-prone as hardware. There is no known way of guaranteeing error-free software which is practical, and in any case, a spare part is much cheaper than a perfect program. Two Volkswagens are probably a more reliable transport alternative than one Rolls Royce — and a lot cheaper.

For some real-time on-line installations, particularly the ones who feel they can afford to have a mostly idle

standby computer, even a doubling of the application coding cost would be an acceptable increase in the project budget if it resulted in almost immediate repair of software faults using the spare-part method.

Fortunately for the rest of us, there is good reason to believe we can afford the spare-part software too. Experience plays surprising tricks on our intuition. Would you believe that writing two programs can be cheaper than writing one of them? That is the experience of a large number of those who have tried.

And even when it hasn't been cheaper, there are reports of "only 10% more." The reason is that dual but distinct software can be used in a variety of ways to reduce the total cost of software production and maintenance, so that the effort of coding it twice (coding being only 5% to 10% of a real-time project, anyway) may be a profitable investment.

One example is the kind of thing that Rault of Thomson-CSF in Paris has practiced. He codes electronic design programs in APL, as a cheap model (one tenth the cost of Fortran) and then recodes, from the model as a plan, in Fortran, to get a program with one tenth of the operational cost.

In order to test the system, he feeds the same inputs into both "models" and checks to see if they produce the same outputs. This amounts to automating the desk checking and automating manual validation of test cases.

If you are planning on thorough testing, this results in a considerable saving of human time, which more than pays for the APL model. The APL model was already paid for since it replaced flowcharts and nonmachine-readable pseudocode.

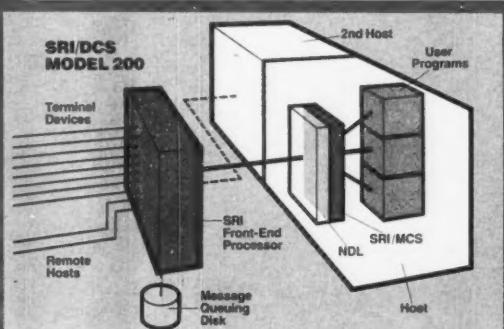
Readers are invited to comment on the material presented here, or the techniques they have developed to cope with the maintenance problem, by writing to Parikh at Shetal Enterprises, 1787B W. Touhy, Chicago, Ill. 60626.

Girish Parikh is president of Shetal Enterprises in Chicago.

Daniel P. Freedman is president of Ethnotech, Inc., and Gerald M. Weinberg is chief scientist at Ethnotech.

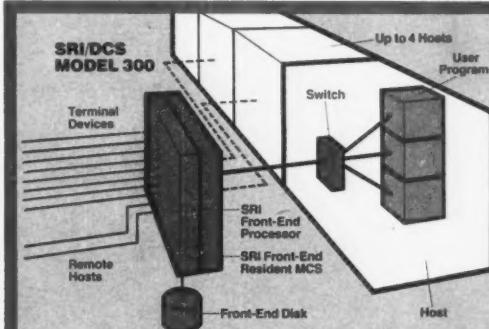
Jon C. Miller is president of Catalyst Corp., Chicago.

Tom Gilb is an independent consultant based in Kolbotn, Norway.



FRONT-END DATA COMM WITH HOST MESSAGE CONTROL

This model couples the front-end processing capability of SRI/DCS Model 100 with the network management capabilities of the SRI/DCS Model 50 host software. Maximum network support is expanded to 208 low-speed or 40 high-speed data comm ports. SRI/DCS Model 200 fully insulates the applications program from the physical data communications network and eliminates complex and time-consuming application-to-system level interfacing. System designers and programmers will be able to develop discrete, efficient applications with unparalleled speed and confidence. A sound investment, if your on-line network is beginning to expand significantly.



FRONT-END DATA COMM AND MESSAGE CONTROL

Now data communications and message control functions can be off-loaded totally from your host(s). This unique product provides on-line capabilities that eliminate the need for NDL and recompilation of network software when configuration changes arise. In NDL's place, SRI/DCS Model 300 substitutes a small front-end interface program in the host, supports existing programs developed under NDL or SRI/DCS Models 50 and 100, provides compiler-free network generation and enhanced structure for on-line applications development. Capable of simultaneously interfacing with up to four hosts, SRI/DCS Model 300 opens options heretofore impossible with Medium Systems.

Your first step

Call or send coupon. Better still, let us arrange an SRI/DCS demonstration in our Data Center or at a customer site near you.



2400 Science Parkway
Okemos, MI 48864
(517) 349-0200

SYSTEMS RESEARCH INCORPORATED
2400 Science Parkway, Okemos, MI 48864

C12109

Please rush further information on SRI/DCS to:

Name _____

Title _____ Phone _____

Company _____

Address _____

City _____ State _____ Zip _____

Computer System _____

SHOCKWATCH

Because a disk pack can be an accident waiting to happen.



Shockwatch® is a precise impact detector which can prevent the use of damaged disk packs and cartridges. Media Recovery, Inc., 1435 Roundtable, Dallas, TX 75247. Call toll free: 1-800-527-9437.

The pressure for constantly increasing utilization of data center resources, both people and equipment, results in conflicting demands on their time. For auditors and financial executives operating in this environment there is now a system to resolve these conflicts. It's called PANAUDIT, the new systems approach to computer auditing.

PANAUDIT, designed by an auditor, can solve your many computer auditing needs. Over 50 audit modules are provided as tools to do as complex an audit as your environment dictates. Some examples of these state of the art routines are: SMF ANALYSIS which provides access to system generated audit trails based upon auditor determined criteria; SYSTEM RANKING provides a consistent, rational and demonstrable methodology for prioritization of systems to be audited; DISTRIBUTION ANALYSIS can be used to identify

unusual activity of quantitative versus quantitative, quantitative versus nonquantitative, and nonquantitative versus nonquantitative fields; and DATA SET COMPARISON provides the auditor with an automated regression test capability. Additionally, it can be used to identify unauthorized changes in programs by comparison to an audit copy.

PANAUDIT makes it possible to audit "through" the computer by retrieving information to your specifications without relying on data processing personnel. Combine this independence with ease of use—made possible by the Audit Command System and the Audit Data Dictionary—and you have a flexible audit system with which to produce your own reports without becoming a technician.

For more detailed information contact Pansophic, the people who bring quality systems software to a worldwide user base.

PANAUDIT

A BETTER WAY TO RESOLVE DP/AUDIT CONFLICTS

PANSOPHIC

709 Enterprise Drive • Oak Brook, IL 60521

800-323-7335



A New Breed of Service Disaster Recovery Centers Springing Up

By John Whitmarsh

CW Staff

Fire. Flood. Explosion. Sabotage.

The possibilities are remote, but computer disasters do happen. And the more a company depends on its computer, the greater its business vulnerability.

For companies in which computer downtime over an extended period would mean significant financial loss, a new breed of service company has sprung up to help.

Specializing in computer backup and recovery services, these companies stand ready to supply computer time or facilities space or both in the event of a computer disaster.

Such assistance is not free. Recovery services are available only to subscribers, and subscription usually involves a written contract covering one to seven years and annual premiums from \$12,000 to \$50,000. Sound like an insurance policy? Exactly.

Two companies now provide backup and recovery services. A third tried to crack the market but went bust before it opened for business (see Page 57).

Contracting with a commercial company is not the only way to enlist recovery help. Some DP departments are joining forces in cooperative efforts, which may be less expensive but usually provide less immediate support.

Facilities range from barebones to fully-equipped, and prices vary accordingly (see chart). But for the business that cannot live without its computer system, such disaster insurance is one answer.

A Natural Choice

"Our company could be seriously hurt if our computer facilities were destroyed and we were not able to process for any considerable length of time," James McGrath, director of DP services at Pennwalt Corp. in

Facility	SUN INFORMATION SERVICES CO.	DATA PROCESSING SECURITY, INC.	WESTERN & SOUTHERN LIFE INSURANCE CO.
Size (sq. ft.)	Fully operational computer center 29,000 total 15,000 raised	Off-site recovery operations center 50,000 total 18,000 raised	Off-site recovery operations center 8,000 total 4,800 raised
Installed Hardware	IBM 3033 (8M bytes) Full peripherals	IBM 3705 controller plus other long lead items	None
Capacity	Two IBM 3033s One IBM 3031	Three IBM 3033s	Two IBM 3033s
Corporate Members	80 maximum	35-100 per recovery operations center	19 maximum
Installed Power	Not available	600 kVA 60 Hz 225 kVA 415 Hz	665 kVA 415 Hz
Installed Air Conditioning	170 tons	180 tons	91 tons
Fire Protection	Halon gas	Halon gas	Hand-operated fire extinguishers
Security System	24-hour guards Card-key access Closed-circuit TV	Card-key access Badge readers Closed-circuit TV Water detection system	Unoccupied building alarm system
Telephone Lines	900 voice-grade	900 voice-grade	10 voice-grade
Uninterruptible Power System	Space provided	Space provided	None
Motorgenerators	Two	Space provided	Two
Availability	Within 4 hours	Within 43 hours	Within 24 hours
Contract Length	One year	Seven years	Three years plus automatic annual renewal
Cost	IBM 3031: \$2,500/mo IBM 3033: \$4,000/mo	\$1,000/mo	\$1,000/mo*
Usage Fee	\$4,500/day	75¢/sq. ft./mo	\$500/day (30-day minimum)
Notification Fee	Within 4 hours: \$50,000 Within 8 hours: \$45,000 Within 12 hours: \$40,000 Within 24 hours: \$25,000	None	None
Extra Charges	Utilities included; communications extra	Utilities and general expenses; optional security	Utilities and general expenses; optional security

*CW estimate

Three Options for Users

Philadelphia, said.

"We have a responsibility to our stockholders to run the business even if we have a computer disaster. And as we use computers more, it becomes harder to do without some sort of backup arrangement."

Last January, McGrath signed for the Sungard protection

package introduced by Sun Information Services Co. of Philadelphia. McGrath wanted to protect his IBM 3031 and 2M bytes of memory plus the expansions he was planning for late this year.

Sun has a fully operational computer center dedicated to backup capability, complete with

an IBM 3033 and 8M bytes of memory, all peripherals and a fully prepared computer room. For McGrath, it was a natural choice.

"Frankly, we had been doing some things to protect our computer that we no longer have to do. Sungard is not an awfully lot (Continued on Page 56)

A Way to Keep Computers on the Right Track

The Beall Channel Switch. Lets you switch critical on-line services to another CPU when failure occurs. Allows specific peripherals to serve more than one computer. Redrives all CPU signals to give you far more flexibility for physical placement of peripherals.

And Beall does all of this less expensively, more reliably and with less opportunity for operator confusion than anyone else.

We make five basic models to provide up to eight switchable interfaces each of which can be logically connected to as many as eight CPUs.

Want to track down more facts? They're in our new brochure. Write or call for it today.

John Beall & Company, Inc.

9103 Third Avenue • North Bergen, N.J. 07047 U.S.A. • 201/854-3562



SYSTEMS & PERIPHERALS

New Breed of Service Offers Disaster Recovery

(Continued from Page 55) more expensive than what we were doing before. I look on it as an insurance policy. And I think it is worth the premium," he said.

Another large systems user, and Sungard subscriber, Connecticut General Life Insurance Co. of Hartford, operates an 8M-byte IBM 3033 and will soon add a second 3033.

"I felt Sungard could handle our critical applications in an emergency," said James G. Loughran, secretary of corporate data processing, when asked why he chose Sungard.

Connecticut General signed a two-year contract that is renewable up to five years, Loughran said. The monthly premium is \$4,000, and the contract is renewable at the same rate.

No Disasters Yet

Thirty-six companies have signed up for Sungard protection since the company opened its recovery site last January. The maximum membership is 80 companies, according to Robert J. Bogle, director of Sungard services.

Sun Information Services plans three additional sites, one more in the Philadelphia area and two others in undisclosed locations.

To date, no company has used the center because of a major disaster. However, several clients have taken advantage of its services for operational backup or development work.

"Those clients use sufficient quantities of time to offset their monthly fee," Bogle explained. "So the center is truly dedicated to backup — both operational and disaster backup."

Bogle claims the need for disaster recovery centers arose because of the deficiencies in reciprocal agreements, which rely on trading CPU time. "Reciprocal agreements aren't worth the paper they're written on," he snorted. "If a DP manager is running his data center prudently, then he doesn't have idle capacity. And he cannot expect anybody else to have idle capacity."

Latest Entry

The latest entry into the disaster recovery market is Data Processing Security, Inc. (DPS) of Fort Worth, Texas.

DPS opened its first recovery operations center (ROC), a \$3.2 million facility, in Fort Worth last month. The pre-engineered 50,000 sq-ft site can accommodate three IBM 3033s and houses voice and data communications links, power supplies, air conditioning, raised flooring and security and fire protection equipment.

Unlike a Sungard member, the DPS subscriber must sup-

ply his own computer, and DPS executives claim manufacturers can supply equipment to the site in a matter of hours.

"In a test run with IBM, in 30 hours and 45 minutes we had a complete, fully equipped 370/158 with 8M bytes of memory all prepared for shipment to the ROC," DPS President Louis Scoma recalled. "We estimated that it would require another two to

three days to have the system fully operational by working around the clock with [IBM's] facility engineers."

The cost of membership in DPS is \$1,000/mo.

DPS plans ROCs in five other cities plus four more ROCs strictly for government and Department of Defense use, Scoma said.

Each ROC will be large enough to accommodate the essential computer configura-

tions of up to three corporate members at once. Because of the chance of simultaneous disasters, Scoma explained, only six member companies in any one ROC may be located within a half-mile radius of each other.

Cooperative Ventures

Some companies that consider reciprocal agreements inadequate yet do not want to subscribe to a commercial re-

covery service have opted for cooperative ventures.

In Cincinnati, Western & Southern Life Insurance Co. will open a recovery operations center in a vacant supermarket next month. The center is owned by Western & Southern, but is supported by 12 other local companies.

The 8,000 sq-ft facility has the necessary air conditioning, power, chilled water unit, mo-

(Continued on Page 57)

Remote processing from Northern Telecom: there's not a single ingredient we can't deliver.



Users Believe 'It Won't Happen to Me'

Anatomy of a Failure: Market Wasn't There

By John Whitmarsh

CW Staff

KING OF PRUSSIA, Pa. — A company set up to sell computer disaster recovery services announced recently that it was closing its doors even before it opened them for business.

Shared Standby Systems planned to convert a vacated DP center to a recovery opera-

tions center that would sell computer time and facilities space to companies whose systems crashed.

The plan flopped.

How could a company designed to help others recover from disaster fail to save itself? "The critical mass was not there," explained James Carter, general manager of Shared Standby Systems, a

subsidiary of Shared Medical Systems Corp. Shared Medical is an \$80 million service bureau handling on-line computing needs for the health care industry.

"If you don't have 30 or 35 members signed up when you open the doors, it's a losing proposition. We tested the market and felt it was not strong enough for us to en-

ter."

Shared Standby reportedly signed up only 18 of the 35 customers it needed to break even.

Idea Marketable

The idea behind Shared Standby seemed marketable. Large corporations depend so heavily on computer systems that they cannot afford to be

without them.

Such companies, the theory goes, will pay handsomely to ensure the availability of a backup system in the event of a major computer disaster.

Reciprocal agreements between companies to share computer time work only when the backup company has machine time to spare. But with computers running flat out for five, six and seven days a week, spare CPU time is becoming harder to scrounge. Hence, the birth of a new market and the appearance of independent companies like Shared Standby that would sell computer time and facilities.

The theory had a flaw: most people believe disaster happens only to the other guy.

(Continued on Page 61)

New Service Springs Up

(Continued from Page 56) torgenerators, raise flooring and supporting space to handle the IBM 370/168 Attached Processor with 6M bytes of memory "and a lot of iron hung on it" that Western & Southern uses in its active shop, according to F. Thomas Schneider, second vice-president and director of the DP operations department.

In the event of a disaster, Western & Southern or any other member of the co-op that takes over the backup facility must contract for and install all its own equipment.

"It would take us 21 to 23 days to get back up and running in the backup facility," Schneider said. "Based on vendor performance records, we could probably do it in less than that. Vendors have assured us they could provide backup equipment very quickly, and they stand on their records."

The cost of membership in the co-op is about \$1,000/mo which, Schneider said, assures availability of the site while providing some comfort to worried DP managers.

"That \$1,000 fee is nothing more than an insurance premium," he added. "For the cost of one clerk, or about \$12,000 per year, a company can have an emergency backup facility in the event of disaster. No one has balked at the cost."

Reciprocal agreements are of little value, Schneider agreed. "The day of the reciprocal agreement is gone. The reason is that most systems today are hybrids, uniquely designed to an individual company's needs. I think we'll see more of these ventures in the future."

DDP Data Entry. Remote Job Entry. On-Line. For every remote processing function, there's a state-of-the-art solution from Northern Telecom Systems Corporation.

DDP

We make DDP systems that grow to fit each of the different sizes you're going to be. Systems that add new capabilities for each new task — without adding idle capacity.

Data Entry

Northern Telecom builds both source Data Entry and volume Data Entry equipment. All with concurrent communications.

Because, if you don't have concurrent communications, your high-speed Data Entry system could spend a lot of time standing still.

Remote Job Entry

Our basic, low-cost Remote Job Entry system is a best seller. But we also deliver large-scale RJE equipment to handle massive throughput and all kinds of sophisticated needs.

On-Line

On-Line hardware from Northern Telecom is plug-compatible with IBM 3270s. But what makes our system unique is the Sprinter™ printer. It makes a hard copy that's easy to read. It switches in minutes from continuous-roll paper to cut forms. And it adjusts with push buttons where others use wrenches.

Why our bigger choice makes us a better buy.

It's hard to keep all the components in your system working together when service people from each supplier work alone.

When you deal with Northern Telecom, one service team can take responsibility for every part of your remote processing operation. More than 1200 Northern Telecom field engineers are ready to go to work for you today.

And because Northern Telecom can meet all your remote processing needs, we can often meet them for less.

But the best reason to talk to us today—is tomorrow.

Northern Telecom is combining data processing expertise with telecommunications expertise—a mix no other company can match.

Today, it means better access to all the processing power you pay for. Tomorrow, it means a smoother transition to the single system that will meet all your processing and communications needs.

Talk to Northern Telecom Systems Corporation. Where computers and communications meet.

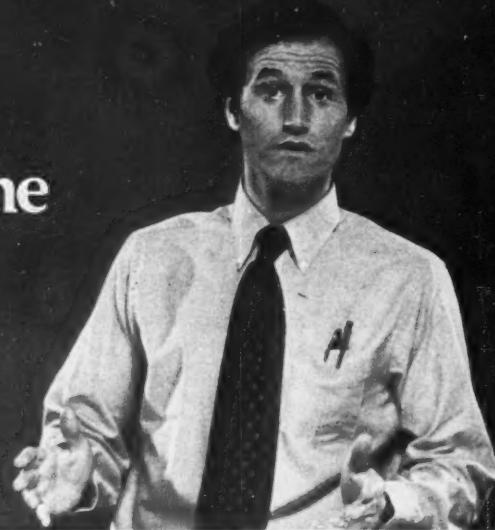
For the office nearest you, call our Marketing Services Department at 1-800-328-6760. In Minnesota call (612) 932-8202.

Or write Northern Telecom Systems Corporation, Box 1222, Minneapolis, MN 55440

nt **northern**
telecom
Northern Telecom
Systems Corporation

You looked at the 11/34 and loved the price.
You looked at the 11/70 and loved the features.

Now look at the
PDP 11/44.



Digital introduces a mid-range mini with a megabyte of main memory, decimal arithmetic, and an expanded 11/70 instruction set.

Now for little more than the cost of an 11/34, our new PDP-11/44 gives you features previously found only on superminis. Like PAX, a physical address extension that gives you a full megabyte of main memory for more users, larger programs, greater throughput. A new MOS ECC memory with interleaving for faster access time. 8KB cache memory for faster program execution and greater DMA bandwidth. Sophisticated memory management. And an expanded 11/70 instruction set.

The 11/44 also offers significant performance advancements in two important languages. Our optimized FORTRAN IV-PLUS compiler and run time system, coupled with our floating point processor option, gives impressive performance advantages over conventional FORTRAN. And our enhanced COBOL compiler with our new optional Commercial Instruction Set processor, delivers powerful COBOL performance and data processing capabilities.

To keep the 11/44 on the job, you get plenty of reliability features, including a microprocessor-controlled ASCII console with extensive system diagnostic capabilities. A new built-in TU58 cartridge tape for easier servicing. Plus facilities for optional remote diagnosis for 24-hour-a-day, 7-day-a-week service with an average response time of less than 15 minutes.

Of course the 11/44 shares the design advantages of our entire PDP-11 family. Most importantly, it guarantees software compatibility the way only the world's broadest range of 16-bit compatible computers can. So your software investment remains intact no matter which system you choose. RSX-11M, the most versatile real time system in the industry. The new RSX-11M-PLUS. Or the new enhanced version of our proven general purpose

and timesharing system, RSTS/E. You can also tailor the 11/44 to your exact application by choosing from a broad line of interfaces and peripherals, like our new 20 megabyte RL02 disk subsystem.

No matter how you look at it, the PDP-11/44 provides an incredibly powerful base for your interactive and distributed processing applications.

And that's saying a lot for a system that costs so little.

- Please send me more information about the PDP-11/44.
- Please have a salesperson call.

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____

My application is: Education Medical
 Laboratory Engineering Government
 Resale Manufacturing Other

Send to: **Digital Equipment Corporation**, 146 Main Street, Maynard, MA 01754, Attn: Communication Services, NR-2/2, Tel. 617-481-9511, ext. 6885. Digital Equipment Corporation International, 12 av. des Morgines, 1213 Petit-Lancy, Switzerland. In Canada: Digital Equipment of Canada, Ltd.

B-12-10-9

digital

INTRODUCING COMPUTERWORLD BOOKS

Starting in January, you'll be seeing ads on these pages for a new **Computerworld** service—**Computerworld Books**. With this new service, we hope to bring to your attention a selection of current books on various topics of potential interest.

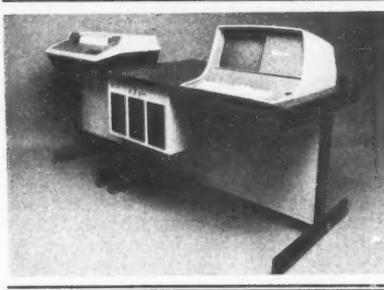
Each title will be reviewed by our editorial staff for its usefulness to our readers before being included in our selections. And we'll provide an easy ordering system for all books advertised. In addition to offering titles from other publishers, we have plans to publish books of our own—books that we feel will be especially important to our audience. Toward that end, we welcome suggestions from you about books you think should be written, or existing manuscripts you believe we should publish. If you are an author with a promising work in progress, let us know. All suggestions and inquiries should be addressed to:

**Editorial Department
Computerworld Books
375 Cochituate Road
Route 30,
Framingham, MA 01701**



COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTER DEALERSHIP AVAILABLE



Centurion Series 100

Dealerships are still available in some major cities for the Centurion product line by Warrex Computer Corporation. Success paths of present dealers prove the integrity of the Centurion line.

- Reliable • Unequaled margins
- Complete and totally upward expandable
- Software packages

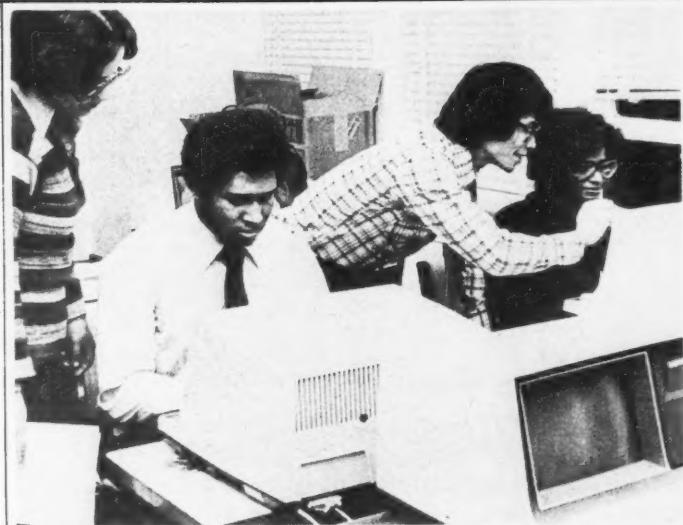
Complete dealer start-up and on-going support by Warrex assures dealers of sound, profitable posture in the shortest possible time.

- Dealer management guidance
- National and local advertising
- Training-technical, programming & sales

For more information contact:

Lou Weinrich
Warrex Computer Corporation
1780 Jay Ell Drive, Richardson, Texas 75081
800-527-4266 214-699-8400

Centurion
A product of Warrex Computer Corporation



Seated at left, Tremholm Turner, manager of systems and programming for J.L. Rivers and Co., leads Ceta students through hands-on programming exercises.

Student Interest Quadruples When DP Training School Moves to Different System

By Marguerite Zientara

CW Staff

BOSTON — Costs plunged from \$7.27 to \$1.55 per compile and student interest quadrupled when a minority-oriented DP training school here switched from an IBM System/3 to a Datapoint Corp. Attached Resource Computer (ARC) for its leased training equipment.

Founded in 1975 and incorporated in 1977 to develop DP employment opportunities for blacks, women and other minority and ethnic groups, J.L. Rivers and Co. (JLR) started out with a machine that allowed only one compile per student per day, according to Joseph L. Rivers, the school's founder and president.

With about 30 students in each course of study, all sharing a single terminal, the situation left a lot of people waiting around for a chance to do some hands-on work. After almost a year of operating under such conditions, JLR started shopping around for a system that could give it better throughput for a reasonable price, according to Tremholm Turner, the school's manager of systems and programming.

The school's management examined equipment from Wang Laboratories, Inc., Data General Corp. and Digital Equipment Corp. as well as IBM and Datapoint, looking for hardware with "unrestricted growth capability, flexibility, easily learned programming and operating techniques and with real-time, on-line, functional business data processing," Rivers recalled.

JLR chose Datapoint's ARC system—which allows each student to run up to six compiler programs per day—because of "its price, all the hardware we could get with it and because it adequately filled our jobs," Turner said.

With an estimated 80% of a student's work consisting of data entry and the other 20% consisting of compiling and executing, the ARC system has the special advantage of allowing several students to do on-line and data entry work while others are compiling. "Our student interest quadruples as they

were able to work together as teams on projects and see results within minutes instead of hours," Rivers said.

Each ARC system uses common peripherals and software. The only fundamental difference between the systems is the number and size of the processors and disks, according to a Datapoint spokesman.

In JLR's case, there are four Model 3800 processors and three Model 6000 processors for a total of 512K bytes of main memory. Disk storage amounts to 20M bytes, with another 100M bytes soon to be added.

The dispersed processing concept is easy for students to grasp, Datapoint claimed, and offers a solution to the problem of how to implement a cost-effective system that can grow without a complete redesign.

Proof of that concept lies in the fact that the school is about to add another Model 6000 processor for an additional 120K bytes of memory. Also included in JLR's configuration are 10 Datapoint 3600 CRT terminals, one 300 line/min printer, one 80 char./sec printer and a soon-to-be-added 150 line/min printer.

Aimed at providing its students with "a firm grounding in the principles and techniques of the computer field," Rivers said, the school gives each student a core understanding of computer language, computer hardware and computer systems.

The curriculum makes intensive use of specific cases that give students the opportunity to apply their knowledge of DP principles toward solving a variety of business problems by recreating the working environment of an on-the-job DP professional, Rivers said.

To round out its program, which operates under a Comprehensive Employment and Training Act (Ceta) contract, JLR includes achievement counseling designed to reinforce the student's ability to succeed in the business world. Such ideas often have not been developed because of minorities' typical exclusion from the "mainstream" for most of their lives, Rivers said.

Recovery Center Shuts Down Before It Opens

(Continued from Page 57)

"The big problem was generating a customer base, trying to convince people that they needed backup," Carter said. "People don't need backup until something happens. That is the mentality that exists in the DP industry. They wait for something to happen."

"It's like selling a ticket to the moon. Most people wait until the first flight takes off before they buy a ticket."

Shared Standby thinks it may have been ahead of its time. "I think we were a year too soon," Serge Rebenkoff, national marketing manager for the defunct company, said. "The need for our services will grow with the industry, but right now it's a little early."

Potential customers expressed considerable interest in the backup service, Rebenkoff said, "and things were moving in our direction, but we couldn't wait for the market to swing around."

Critical Mistake

Rebenkoff figures the company made a number of critical mistakes.

First, the marketing team misjudged the closing cycle. "We anticipated that the time from initial contact with a customer to a written contract would be under six months," Rebenkoff said. "We found the average closing cycle was six to nine months."

Second, Shared Standby was selling an intangible item. Management expressed polite interest, but would not put money where its mouth was.

Most companies opted to invest in tangible assets rather than bet on unforeseen disaster, Shared Standby learned. "It's part of the 'it won't happen to me' syndrome," Rebenkoff said.

Ironically, the backup service cost less than new hardware. Rebenkoff said his service would have required a financial commitment of \$50,000 to \$60,000 over a one-to-five-year period, but "management prefers to put the dollars into another data center, even though our services cost nowhere near the same as a new facility."

The idea for a backup service grew out of a system upgrade at Shared Medical Systems. The company was moving to a new multimillion dollar DP center and figured it could defray the cost of maintaining two DP sites by sharing the old one with other companies.

That, in fact, seems to have been Shared Standby's third mistake. The company failed to convince potential members of its financial commitment to the business.

"I got the impression that Shared Standby was trying to subsidize its own backup site as opposed to being commit-

ted to the recovery concept as a profit-making venture," commented one DP manager who eventually signed with the competition.

The concept crystallized 18 months ago. In that time Shared Standby signed up only 18 customers, though Rebenkoff claims to have letters of intent and commitments from twice that number.

Shared Standby calculated

its own costs to maintain the recovery operations center with an IBM 3033 in place at \$200,000/mo.

Users of the center were to be charged by the size of their installation. Customers requiring only half the 3033's capacity would pay \$3,500/mo; larger customers needing full use of the machine would pay \$5,500/mo. All members would sign a five-year contract, and the

only additional charge would be a \$4,500 daily use fee in the event a customer suffered a disaster and actually moved his operations into the center.

But the cost structure broke down under the pressure of competition. One competitor offered shorter contracts aimed at smaller users. Shared Systems responded with three-year contracts and quarter-machine increments and apportioned prices. But

the numbers failed to add up. Meanwhile, the time to make a commitment to open the center was drawing close.

"We had to open in the last quarter of this year," Rebenkoff said. But with only 18 customers signed up, the company projected its losses for the first 18 months of operation at \$1 million.

Six weeks ago, Shared Standby canceled its agreements with its 18 customers.

If you are processing scientific data on a general purpose computer, you need to know about FPS Array Processors.

The unique, efficient instruction set and complementary architecture of FPS Array Processor computers are specifically designed to accommodate the vector and matrix algorithms for scientific data processing. High processing speeds result from the seven independent data paths that move operands synchronously to and from the 38-bit floating-point arithmetic units, accumulators, and multiple memories. This inherent simplicity allows FPS Array Processors to be readily simulated on the host or front-end computers for program development. It allows FPS to provide you with a large volume Scientific Math Library (more than 250 functions) and additional volumes for Signal Processing and other special operations. And it allows a FORTRAN Compiler so you can easily create your own special, unique, or proprietary functions.

A typical minicomputer FPS Array Processor system (such as a PDP 11/34 and AP-120B) provides a computational throughput for scientific and signal processing algorithms that is on the order of two hundred times greater than the throughput of the minicomputer alone.

A large computer FPS Array Processor system allows heavy data processing which would severely load the host CPU, to be off-loaded to the AP-190L for efficient processing while the host CPU is utilized for tasks more appropriate to its architecture and operating system.

More than 1000 FPS Array Processor computers are in use worldwide, providing their users with the computational power of large, mega-dollar scientific computers at greater reliability, greater applicability, easier programmability, and at a small fraction of the cost.



FLOATING POINT
SYSTEMS, INC.

CALL TOLL FREE 1-800-547-1445 Ext. 4999
P.O. Box 23489-S 5001 Portland, OR 97223
503 641-3151, TLX: 360470 FLOATPOINT PTL

FIPS Sales and Service Worldwide: Boston, Calgary, Chicago, Dallas, Denver, Detroit, Houston, Huntsville, Los Angeles, New York, Orlando, Ottawa, Philadelphia, Phoenix, Portland, San Francisco, Toronto, Washington, D.C. International offices: Geneva, London, Munich, Paris, Tel Aviv (Electronix, Ltd.), Tokyo (Hakuto Co. Ltd.)

Service Bureau Just Too Slow

Apparel Maker Buys CPU, Tucks in \$100,000

By Marguerite Zientara

CW Staff

SAN FRANCISCO — A sportswear manufacturer here said it is saving more than \$100,000 a year in clerical labor and invoicing expenses, as well as speeding up order processing, after going from a service bureau to an in-house mainframe.

Part of an industry that has become so complex and unpredictable that even the most intuitive merchandisers find they must base marketing decisions on information provided by an efficient computer system, Fritzi of California first utilized a Los Angeles-based service bureau to fill its need for current data.

In 1974, the firm's sales were in the \$20 million range and

the service bureau was adequate for its needs. Orders were batch-processed from data that was keypunched in Fritzi's DP department here.

The information was used to produce various sales reports, picking tickets and invoices and a bill of materials explosion for piece goods requirements.

Turnaround Too Slow

However, by the end of 1975 Fritzi's sales had reached \$38 million. The company began to have serious problems in order processing, production planning and accounting.

"One of the major problems was the slow turnaround time involved in sending data to Los Angeles and waiting for processed material to be re-

turned," Lew Jenkins, vice-president of management services, recalled. "At best, it would take five or six days for us to get our sales reports back."

With more than 500 styles of clothing in production, merchandisers and production planners were not getting the information they needed fast enough on the movement of inventory so they could get just the right amount of merchandise to the marketplace while it was still in heavy demand, he explained.

A relatively low average unit price for its goods makes close control of Fritzi's costs essential. "However, we found that our data processing and clerical costs were rising disproportionately to sales," Jenkins said.

The firm began to send overflow keypunching to several different outside shops, and its order processing was constantly behind schedule. The workload in accounts receivable and other areas of accounting reached "crisis proportions," he added.

Only Practical Solution

In mid-1976, management concluded the only practical solution was to install an in-house computer and an on-line, interactive system to handle order entry, invoicing, accounts receivable, material control, production planning and daily sales reporting.

"Our situation was so critical that we could not spare the time to develop a new system from the ground up," Jenkins said. So Fritzi began studying the handful of packaged systems available at that time.

Because Fritzi "liked the hardware from the three manufacturers," it considered Burroughs Corp., Hewlett-Packard Co. and IBM. "The HP package was from a service bureau we had very little respect for, the Burroughs program never developed [as promised] and IBM had a firm thing called Apparel Business System (ABS) that we zeroed in on," Jenkins said.

The ABS was installed in June 1977. After some fine-tuning to adapt the system to Fritzi's specific requirements, "we were in a position to actually begin booking orders the following month," Jenkins noted.

The ABS applications now run on an IBM 370/148 with 1M byte of main memory and three 3350 disk drives supplying 2.8G bytes of on-line storage. There are three 3420 tape drives and a 2501 card reader that "we never use," Jenkins said.

On-line, interactive computing is done using 63 Model 3270 CRT terminals located in

the company's various operating departments. The network also includes four Model 3289 printers operating at 150 line/min and one 3203 at 1,200 line/min, serving the firm's three shipping lines and the accounts receivable/credit areas.

Fritzi of California is a beta test site for IBM's DOS/VSE operating system. Fritzi has been running it for the past eight months and found it to be "exceptionally good" and the compatibility of the entire system to be "fantastic," according to Jenkins.

Fritzi has a 4341 on order, which it hopes to acquire by next summer.

Order entry is a key application in the system. Incoming orders now go to five data entry operators who input the order data through CRTs. The computer automatically validates customer numbers, styles and color codes at the point of entry, alerting operators to any errors through messages on the terminal screen.

Operators must key in only minimal data, since other information such as account name, address and ship-to instructions are supplied automatically from the account master file. The computer automatically extends and totals the prices.

During the procedure, the computer runs a credit check on the accounts involved, using currently updated Dun & Bradstreet exception credit information stored on disk. "We now process up to 1,000 orders per day, more than twice the volume of orders we were handling with the keypunch operation," Jenkins noted.

In customer invoicing as well, the system has speeded

the operation and generated significant savings. Since computer-generated invoices are automatically printed right at the shipping line, the invoices can be included in the cartons and shipped with the merchandise.

"That lets us save approximately \$70,000 a year that otherwise we would have to spend on postage to mail the invoices separately," Jenkins noted.

Dramatic Benefit

One of the most dramatic benefits of the system is the improvement in the flow of market information to management, according to Jenkins. "Where in past operations major buy/no-buy and cut/no-cut decisions were based primarily on intuition, the on-line system now allows the use of important sales information in producing a wide range of sales analysis reports," he said.

The key management tool is a daily sales report that shows the total amount of sales booked and shipped that day and season-to-date for all lines, covering both the current and future style seasons.

"I would hate to think of the chaos we would be going through today without the planning ability the system gives us," Jenkins said. "For example, where four years ago we had only about 10 fabrics to deal with, we now have some 50 different fabrics in the line, and these change constantly to conform to all the different 'looks' that come and go in the junior sportswear field."

"The on-line system now gives our planners the ability to keep in tune with this very fickle market."

TONE 3

IS HIGH PERFORMANCE—LOW OVERHEAD

TSO for VS1

CHECK THESE FEATURES

- Edit with full screen capability
- Internal reader job submit
- Output retrieval with RES support
- System maintenance
- Program development
- Data entry
- System debugging
- Text editing
- Performance monitoring
- User command interface
- Interactive program execution
- Operations console support
- Dataset maintenance
- Catalog management
- Standard IBM TSO commands
- Enhanced 3270 usability
- Full ASCII terminal support
- No user swapping
- No TCAM
- No VS1/2 overhead

Write for
Details

1124 N. GILBERT
ANAHEIM, CA 92801
(714) 991-9460

Why Hand Shift?

Automatic Conversion DOS to OS

Face it, you could make this conversion manually. But the job is tedious and time consuming. A DASD translator, on the other hand, makes the conversion automatically with extreme accuracy. This relieves your programming staff from a lengthy, error prone task and saves you money.

Prove the accuracy of our translations to yourself with a low-cost test evaluation. You'll be convinced of our effectiveness. And you can choose from a variety of service options, ranging from use or lease arrangements to the complete DASD turnkey conversion package.



Low-cost Test Evaluation. Send or call for our free literature/dkt.
DASD Corporation • Corporate Services Center
Dept. CWM10 • 9045 North Deerwood Drive
Milwaukee, Wisconsin 53223 • 414/355-3405

FREE COPY! FOR DEC USERS "HARDCOPY"

The Newsletter for DEC and DEC Compatible Systems Users

LATEST NEWS!

BUY, SWAP & SELL COLUMNS!
Send business card and description of your DEC configuration for Free Subscription

DATALEASE

2770 EAST REGAL PARK DRIVE
ANAHEIM, CA 92806 714-632-6986



TERMINAL SPECIALS OF THE MONTH

- Perkin-Elmer Bantam
- Televideo TV1912-Block/Char/Edit
- Decision Data 120cps. RO/KSR

Other models avail.-Qume, LSI, VT52/100 comp.

(617) 272-7380

Computer Peripherals of New England, Inc.

20 Brentwood Rd. Chelmsford, Ma. 01824

QTY 1
\$795
775
1495/1795

Naval Center Credit Union Keeps Operations Afloat

Special to CW

NEW LONDON, Conn. — Employees at the Ft. Trumbull Credit Union (FTCU), located at the Naval Underwater Systems Center (Nusc) here, probably know very well what it means to get in over one's head.

That is why executives at the state-chartered institution recently scrapped their original mainframe and installed a Wang Laboratories, Inc. VS minicomputer that has been keeping the organization and its more than 2,600 members afloat ever since.

The credit union deals exclusively with the Naval center, catering to all personnel, pensioners, annuitants, their immediate families and all Nusc departments. Since the group is service-oriented, it must be able to react rapidly to the requests of the membership, whether it be in the form of financial ques-

tions or applications for loans, according to the credit union's manager, Dave Kenyon.

Conversion Under Way

When Kenyon joined FTCU in 1974, it was a completely manual organization with a staff of four full-time teller/bookkeepers, servicing 2,000 members. However, it was in the process of automating its operation.

"One of the underlying reasons I was hired at FTCU was that I wasn't opposed to working on the conversion of the present manual operation to a computerized system if the results of a system study already under way presented computerization as a solution," Kenyon observed.

After checking with a number of other credit union offices and computer manufacturers, Kenyon and two colleagues — Ted



Dave Kenyon (right), director of the Ft. Trumbull Credit Union, demonstrates the Wang Laboratories, Inc. VS minicomputer.

Einstein, a former treasurer of the credit union, and Mark Becker, a computer systems analyst — decided on a Basic Four Corp. 400 BB-I CPU. A similar system was working at a credit union in Caladonia, Ont., Canada, and seemed to fit FTCU's special needs.

(Continued on Page 68)

MPU-Based Desktop System Performs WP, DP Functions

PROVO, Utah — Zeda Computers International has unveiled a self-contained microcomputer system that handles both data processing and word processing (WP) chores and has a potential disk storage capacity of 3.4M bytes.

Housed in a desktop cabinet, the Zeda 580 has a Z80A microprocessor and 65K bytes of dynamic random-access memory (RAM). The system supports two RS-232 serial ports, two parallel ports plus a parallel printer port, one hard disk port and a floppy disk drive connector capable of carrying two external floppy disk drives — either mini or 8-in., a spokesman stated.

The basic system has two standard double-density minifloppy disk drives that provide access to 400K bytes of on-line storage, a keyboard and CRT. In addition, the unit incorporates a direct memory access (DMA) controller that can be programmed to interconnect nearly all of the interfaces with the internal RAM, keyboard and CRT terminal.

Programmable Keys

Twenty-four of the keyboard's keys are software-programmable for a total of 48 special functions utilized by the firm's word processing, inventory and accounting software, the spokesman added.

The 580's disk operating system is CP/M-compatible and can handle all interrupts, data transmissions, keyboard definitions, error detection and disk storage and retrieval functions.

Finally, the unit contains a real-time clock, audio beeper and parity-checking logic. It can be reprogrammed to facilitate foreign graphics or graphics video displays.

The Zeda 580 is priced at \$6,837, which includes the operating system software and a choice of one application package, the spokesman said from 1662 W. 820 North, Provo, Utah 84601.



The Zeda 580 System

DG Controllers Get Tape System

SAN DIEGO — Innovative Data Technology, formerly Tandberg Data, Inc., has unveiled an IBM/Ansi-compatible .5-in. digital tape system for Data General Corp. 4030 and 4196 magnetic tape controllers.

The Model MTS 1050-22 was designed to operate with DG's RTOS and RDOS operating systems through an adapter that plugs into the CPU chassis. The subsystem itself consists of a tape transport and a formatter that provides dual-density, 9-track operation.

The tape system has both 800 and 1,600 bit/in. phase-encoded recording and playback capabilities.

The unit features a maximum I/O data transfer rate of 36K- and 72K byte/sec. Up to eight tape transports can be daisy-chained to a single-MTS 1050-22 subsystem for disk backup or archival storage, a spokesman noted.

The subsystem is priced at \$8,150, while the slave drives cost \$5,450. Discounts are available with quantity purchases from Innovative Data Technology at 4060 Morena Blvd., San Diego, Calif. 92117.

TI745 743 765 820 825



DAS, the single source for trouble-free telecommunications. Nationwide.

With fully-stocked branch offices located from coast to coast, DAS, the nation's largest independent supplier of terminals, has the facilities and capabilities to provide instant, off-the-shelf delivery, sophisticated applications assistance, and super, on-site service at the lowest possible cost.

You save time and trouble with our free, 90-day warranty, available on over 30 state-of-the-art products from DEC, Diablo, Lear Siegler, and Teletype. This unique protection plan covers not just the terminal, but every systems component we sell. So, whenever you need service there's only one reliable source to call. DAS' computer-dispatched technicians arrive on-site within one working day or less.

So, join the over 3,000 users throughout the country who depend on Data Access Systems, the single source for trouble-free telecommunications. For information on economical lease or purchase plans or details on a complete range of supplies call your local district office, or toll free: (800) 631-9604 or 9605.

TI 825 for LA 36 requirements.

Now in Seattle!

Data Access Systems, Inc.

Corporate offices:
Boston-(617) 789-5422 • Washington, D.C.-(703) 589-7711 •
New York-(212) 592-0700 • Chicago-(312) 967-0270 • San Francisco-(415) 967-0440
N.J. 07046 • (201) 335-3322
or toll free (800) 631-9604

District offices:
Boston-(617) 789-5422 • Washington, D.C.-(703) 589-7711 •
Los Angeles-(213) 538-4100 • San Francisco-(415) 967-0711 •
Chicago-(312) 967-0270 • New York-(201) 335-3322 •
Atlanta-(404) 449-5435 •
Seattle-(206) 251-5070 •
Houston-(713) 692-5965 • Dallas-(214) 256-5526



WORK

**Lear Siegler brings you
two steps closer to
exactly what you need
in a smart terminal.**



At Lear Siegler, we've learned our lessons well.

We don't make five or ten different smart terminals. And we don't attempt to overpower you with the broadest line of terminals on the market.

Why? Because we know you've got enough problems

The simple fact is, there are only two models in our line of smart terminals. But they can handle just about any application you'll run into. Something other manufacturers need terminals galore to accomplish.

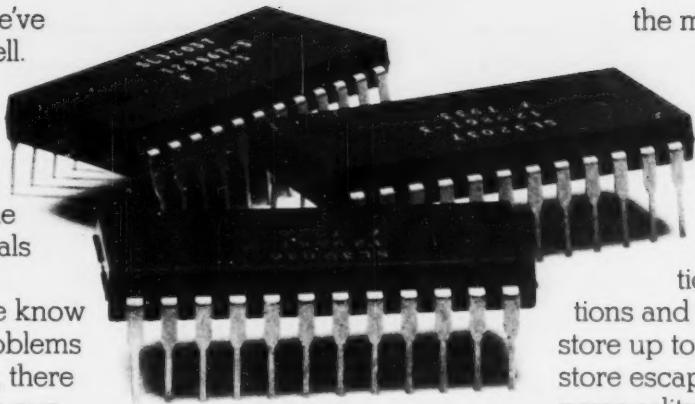
The ADM-31 and ADM-42 can do so much, in fact, that you can't make the wrong choice, no matter which one you choose. Not only have we put an end to looking at dozens of models from dozens of companies — we've put an end to dozens of headaches.

NOW YOU CAN TEACH YOUR TERMINALS HOW TO BEHAVE.

We understand how frustrating it can be to try and please all the people all the time. Trying to put in capabilities we think they need, and having to leave out something else. So we got crafty. And gave both our terminals user-programmable behavior modification.

Both the ADM-31 and ADM-42 have firmware (the instruction sets inside their PROMS) that you can easily reprogram. Just follow the directions in the fully-documented programming instruction manual we provide. And you end up with a terminal that's exactly what you want, even though it's not exactly what you bought.

And, if you run into problems, just call our special Applications Engineering Staff. They'll



PERSONALITY PROMS AND FACTORY ASSISTANCE MAKE USER-REPROGRAMMING A SNAP.

help you through any difficulties with reprogramming, interfacing, setting the terminal's personality, special applications, or understanding the features and functions.

Who knows? They could even come up with suggestions you never considered.

THE ADM-31 AND ADM-42. TWO TERMINALS, DOZENS OF FEATURES.

We built the ADM-31 and ADM-42 with all the standard features you've come to know, love, and need in smart terminals even without reprogramming.

For instance, you get full editing capabilities. Reduced intensity for identification of protected fields. Blinking, blanking, and reverse video. Formatting. High resolution monitors. Even limited line drawing capabilities.

And we've included the latest in microprocessor technology. Both are microprocessor based, which makes them reliable and, more importantly, easier to use. Because their design architecture has a microprocessor with multiple microprocessor-based controllers that tie into

the master microprocessor.

Nor did we forget those indispensable function keys.

Naturally, both the ADM-31 and ADM-42 have them.

On the ADM-42, for example, you get 16 function keys, shiftable to 32 func-

tions and optionally programmable to store up to 64 characters. This lets you store escape code functions (such as personality modifications) to reduce

several escape sequences to one key stroke. And you can store frequently used phrases up to 64 characters, which provides you with impressive time savings.

When you get right down to it, the ADM-31 and ADM-42 are really functions of your imagination.

SMART TERMINALS. SMART CHOICES.

So there you have it. Two very good reasons why you only need to look at two very smart terminals.

Gone is the need for looking at dozens of terminals, from dozens of manufacturers, with dozens of high price tags. With our two models, you have everything you need. User-reprogrammable personality PROMS, function keys, and a willing-to-please Application Engineering Staff just aching to solve any problems you may have.

Sound interesting? Then call or write to us at Lear Siegler, Inc./Data Products Division, 714 N. Brookhurst St., Anaheim, CA 92803, (800) 854-3805. We'll tell all you want to know about the ADM-31 and ADM-42.

And then you'll see why your search for the right smart terminal just ended.



Desktop Turnkey Based on 8085 Micro Built for Small Businesses

VAN NUYS, Calif. — Iplex International, Inc. has introduced for the small business user a desktop microcomputer system that features a built-in dual floppy disk drive and up to 56K bytes of random-access memory (RAM).

The Iplex 8085 is based on Intel Corp.'s 8085 microprocessor, but is fully compatible with 8080-type software, according to its vendor. The system includes a CRT terminal and at least 600K bytes of on-line disk storage, which can be expanded to 1.2M bytes.

Users start up the system with a single keystroke. Following this, each location of the RAM is automatically

tested and the installed memory size and operating system status are flashed on the CRT screen.

The turnkey package is supplied with disk-based Extended Basic software, a disk operating system and a utilities package including a 3K-byte programmable read-only memory-resident system monitor.

Other software supported on the 8085 includes CP/M, CBasic, Microsoft Basic, Fortran-80, a data base management package and a variety of commercially available applications programs a spokesman said.

The cost of the system, with software documentation and maintenance manuals, is \$3,695. However, quantity dis-

counts are available for OEMs and system houses, Iplex said from 16140 Valerio St., Van Nuys, Calif. 91406.



Iplex 8085

Disk System From Datrex Has 10M Bytes

PHOENIX — Datrex, Inc. has announced a cartridge disk system that provides 10M bytes of storage for Digital Equipment Corp. PDP-11 and LSI-11, Data General Corp. Nova or Interdata, Inc. computers.

The system includes the cartridge disk drive plus an embedded controller that is geared for the user's microcomputer or minicomputer system.

According to a Datrex spokesman, the storage capacity of the unit makes it possible to replace or add the equivalent of four DEC RK-11 drives, saving hardware space. The system is fully compatible with both the user's interface and software.

The disk drive package costs \$3995 from Datrex at Suite 109, 3101 W. Thomas Road, Phoenix, Ariz. 85017.

System Based On Micronova

WOODLAND HILLS, Calif. — Targeted for the small business and office environments, Compal, Inc.'s Model 9000 computer system features a 16-bit processor and both hard and removable cartridge disk media.

Based on Data General Corp.'s Micronova 602, the Model 9000 has 64K bytes of random-access memory and a CRT terminal with a detached keyboard. Three terminals can be added to the system, a spokesman said.

The hardware includes a 10M-byte hard disk with a 5M-byte removable cartridge disk drive. An additional 12.5M bytes of storage can be added to the system to accommodate expansion.

The package also incorporates a high-speed matrix printer.

Software applications that can be run on the system cover order entry billing, inventory control, sales analysis and other typical business programs as well as a data base management system and a communications routine.

The Model 9000 sells for \$19,995. Software packages between \$1,500 and \$2,500 are available as integrated products.

Compal is at 6300 Variel Ave., Woodland Hills, Calif. 91604.

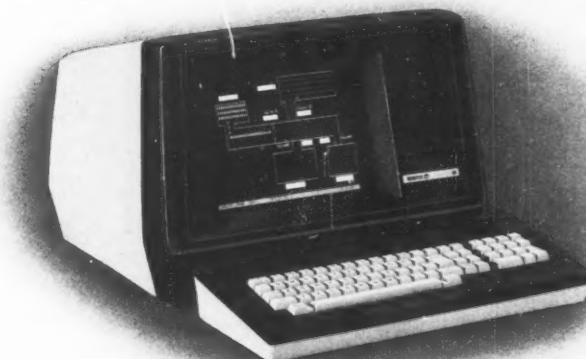
Supply Catalog Free To Users of Minis

CLEARWATER, Fla. — Data recording products, forms, custom furniture and other minicomputer and office supplies are featured in a catalog by Executive Computer Supplies.

The catalog is free from the firm at Suite 114, 1437 Belcher Road S., Clearwater, Fla. 33516.



MICRO B a terminal family designed for OEM planning



MODULAR CONSTRUCTION

Micro B Model DM1A

EXPANDED CONVERSATIONAL

14 Key Numeric Pad, Line Drawing, Video Attributes, 128 ASCII Character Set

Micro B Model DM20

EDITING

Full Editing Features, Buffer Transmission Modes, Expanded Keyboard with 16 Function Keys

Micro B Model DM30

ADDITIONAL MEMORY

All features of the DM20 plus 8K RAM Two Page Capability, Parallel Printer Port, Beehive's B300 Characteristic Emulator.

Call for applications assistance and delivery

TOLL
FREE
USA (800) 453-9454

CALIFORNIA Costa Mesa (714) 540-8404 TWX 910-595-2572 • Sunnyvale (408) 738-1560

FLORIDA Altamonte Springs (305) 830-4666 ILLINOIS Arlington Heights (312) 593-1565

MASSACHUSETTS Woburn (617) 933-0202 NEW YORK New York (212) 682-2760 UTAH Salt Lake City (801) 355-6000

VIRGINIA Falls Church (703) 536-5133

EUROPE Amsterdam, The Netherlands Phone 020-451522



BEEHIVE INTERNATIONAL

"A proven competitive manufacturer of smart terminals"

Transport Switches Tracks Without Help of Operator

SALEM, N.H. — Designed for remote unattended dual-track selection, MFE Corp.'s ANSI/Ecma-compatible digital cassette tape transport features a two-track read-after-write head so the operator does not have to flip the cassette at the recording midpoint, the vendor said.

The MFE 452B, after conventionally writing to Track 1, rewinds the cassette and electronically switches tracks. Either track can be accessed at will; it takes about 150 msec to switch tracks, a spokesman claimed.

The device has a data trans-

Apple Users Gain Remote Regulator Of Electric Units

SANTA CRUZ, Calif. — Mountain Hardware, Inc. has introduced a plug-in control system for Apple Computer, Inc. microcomputers that is said to allow users to regulate electrical devices by commands sent over 110 Vac wires.

The control system consists of the Introl/X-10 controller card, which plugs into the Apple's peripheral slot, a BSR/X-10 command console that plugs into an ac outlet and three remote modules.

The system comes with software, incorporated on the controller card, that allows the user to affect electrical devices on predetermined schedules, such as a particular day of the week or an exact date for a particular event, a spokesman noted.

The system costs \$279, but the controller card can be purchased separately for \$189. Additional remote modules are also available for \$15 from Mountain Hardware at 300 Harvey West Blvd., Santa Cruz, Calif. 95060.

Time Controls TRS-80, Printer

HOLLYWOOD, Calif. — National Software Marketing, Inc. has taken the plunge into the hardware pool by announcing a printer timer geared for Radio Shack TRS-80 microcomputers and Centronics Data Computer Corp. Model 779 printers.

The timer can turn the printer on and off automatically using signals sent over the printer cable.

It requires no software or hardware modification other than soldering three wires to the printer and mounting the unit to the inside of the printer cabinet, a spokesman stated.

The timer costs \$95 from National Software Marketing at 4701 McKinley St., Hollywood, Fla. 33021.

fer rate of 32K bit/sec. It can store up to 720K formatted characters.

Long-term transport speed accuracy is provided by a built-in Tachlok speed control, according to MFE. The unit has a 15,000-hour mean-time-between-failure rate.

Priced at \$750, the 452B can be ordered from MFE's Digital Products Group, Keewaydin Drive, Salem, N.H. 03079.

Boards Allow Decsystem-2020 To Store More Than 2M Bytes

CRANBURY, N.J. — Incorporating 16K dynamic random-access memory chips, Dataram Corp.'s single-board semiconductor add-on memory provides an additional 256K bytes of storage for Digital Equipment Corp. Decsystem-2020 minicomputers.

The DR-1205 board is internally structured as 64K-byte by 32-bit words, consisting of 36 data and seven error-correcting bits.

The memory units can be operated in conjunction with or in place of DEC's Model

M8629 semiconductor array Dataram said. They interface to the 2020's resident timing and control board.

The cycle and access times of the add-on boards are 1,050 nsec and 600 nsec, respectively. The DEC machine can accommodate up to eight boards, expanding the mini-computer's memory to more than 2M bytes, a spokesman stated.

The 256K-byte boards are priced at \$5,600 each from Dataram at Princeton-Hightstown Road, Cranbury, N.J. 08512.

A Major Enhancement

Release 8 Is The New MARK IV.

Now you can choose a major new product that can dramatically reduce the cost of programming your business applications.

It's called MARK IV® Release 8. It offers major new improvements in throughput, graphics capabilities, on-line support, and multi-dimensional arrays.

(MARK IV is the most successful application implementation software product ever sold. Today it's in use at more than 1,400 computer sites in 44 countries.)

Release 8 has been configured to deliver optimal price/performance for your operating system, data base, and virtual memory needs, and DOS-level systems at attractive prices.

Enhancement By Committee.

Many of the advantages available to you in Release 8 are the direct result of the experience of actual MARK IV users: the System Evaluation Committee of the MARK IV User Group.

The number one priority of this experienced group was array processing.

So now the new array definition capability of Release 8 lets you process multi-dimensional arrays to quickly produce aging reports, cross-foot financial reports, and statistical summaries.

Enhanced Throughput.

You achieve it through major architectural changes in Release 8 software.

You get single-step processing capability. This simplifies execution procedures and reduces I/O channel activity for report sorting.

And since Release 8 uses sophisticated compilation techniques, execution speed is comparable to equivalent COBOL jobs.

Enhanced Data Display.

Graphics is another new feature of Release 8. You can produce vertical or horizontal bar graphs. Scatter diagrams. Absolute or relative bar graphs. And recap summary reports.

All of this display flexibility can be extremely useful in graphic management reports, forecasting, and mathematical or trend analysis.

Enhanced On-Line Support.

Release 8 now makes the MARK IV data inquiry language available for CICS and INTERCOMM environments—together with several query language extensions and enhanced IMS/DC support.

And Release 8 now provides a compatible query language for use with all of these operating systems and monitors:

OS, OS/VS, DOS, DOS/VS, IMS/DC, CICS, INTERCOMM, TSO, and CMS—among others.

Enhancement Of The Mind.

MARK IV Release 8 is a new Implementation System from Informatics. It is a working tool. A system specifically designed to expand the problem-solving power of the human mind.

Discover all of the ways it can help you realize the maximum potential of your programming staff.

Just mail the coupon. Or, call (213) 887-9121. Telex: 69-8473

Mr. Ron Mullenax, Informatics Inc.
21050 Vanowen Street, Canoga Park,
California 91304

Yes, tell me more about MARK IV
Release 8 and how it can enhance
the productivity of my operation.

informatics inc

The Information Management Company

CW 121079

Name	City	State	Zip
Title			
Company			
Address			



Mini Keeps Naval Center Credit Union Afloat

(Continued from Page 63)

Unfortunately, after FTCU acquired the hardware/software package, Kenyon discovered that the software, which was written by a Canadian firm, required a great deal of rewriting in order for it to process the credit union's accounts.

Not only were the software's disk utilization routines unusable, but the programs could not even correctly calculate

simple loan interest rates, Kenyon recalled.

However, after all of these major bugs were chased out, the system began to turn things around in the financially growing office.

Operations that were once very time-consuming took less time, passbooks were eliminated and statements were generated for the then 2,500 members in about 16 hours.

Up to the beginning of 1978,

the response FTCU received from its members was very enthusiastic. It then began to explore new areas of service.

"For the past four years, the system has done what we expected of it and offered us the opportunity to start thinking about new, multifaceted offerings of services to our members," Kenyon commented.

"But at the same time, we could also see some grave growth limitations of the sys-

tem that would hamper our ability to add some future services.

"We could handle all the members' requests — we could easily handle 175-200 transactions, consisting of deposits and withdrawals, each day, and this with no increase in our staff," Kenyon continued.

"But the real challenge was ahead of us — automatic account transfer, term certificates, car loans, management

reports."

The credit union formed a committee, headed by Kenyon, to investigate the Basic Four machines and other computer systems to see if they could meet FTCU's down-the-road needs.

In their search, there were three major considerations: price, the system's ability to handle a large tape drive and the manufacturer's ability to supply an extensive security system to protect the members' data.

The group decided on Wang's VS minicomputer, which not only offered a well-integrated security system and the facilities to accommodate industry-standard tape drives, but also had telecommunications capabilities, Kenyon said.

In addition, the system could be expanded by 32 terminals, up to 512K bytes of memory and up to 2.3G bytes of disk storage.

Software Considerations

Software was another important reason for selecting the Wang machine. Writing in code in Basic on the Basic-Four system was extremely difficult and cumbersome, Kenyon observed.

However, with Wang's Editor and Ezcobol, FTCU was able to design and code the new system in two months, resulting in substantial savings in personnel costs and time, Kenyon said.

Right now, Kenyon is trying to get off the ground the idea of a "regional processing center," which would allow a number of smaller credit unions who cannot afford a system, or are presently too small for one, to tie into a centrally located site.

This arrangement would save the smaller credit unions money and time, plus offer them growth in service. At the same time it would allow them to retain their anonymity, since the files for each credit union would be secure and separate from the files of any other users on the system, Kenyon remarked.

Believe it or not, there are people in this world settling for character printing that is less than perfect.

What do we mean by perfect?

We mean as perfect as the printout you are now reading. It was produced on a Sprint 5" Daisywheel Terminal from Qume. Absolutely nothing has been retouched.

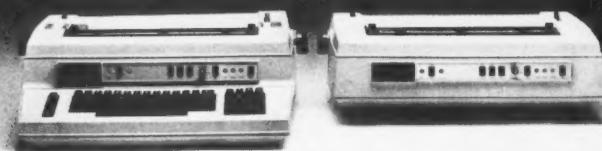
In addition to impeccable printing, Sprint 5 will also follow your orders to the letter. All standard 128 ASCII codes. Plus 43 Qume-defined, user-oriented commands for dynamic positioning, tabbing, graphics, test diagnostics, program mode, form feed and more.

Qume also offers you a large selection of printwheels and ribbons to make your printer speak over a dozen languages in a variety of typefaces and colors.

If you've been living with fuzzy printouts, help is as near as your telephone. Just contact your nearest data terminal dealer or Qume for information on Sprint 5 and our complete family of quality printers.

2350 Qume Drive • P.O. Box 50039 • San Jose, California 95150 • TWX 910-338-0232 • (408) 942-4000

SPRINT 5 PERFECTS THE LETTER-PERFECT PRINTOUT.



Qume sales offices: California: Santa Clara (408) 247-6990, Torrance (213) 326-7812. Illinois: Oak Brook (312) 323-2802. Massachusetts: Needham (617) 449-1052. New Jersey: Upper Saddle River (201) 327-4244. Texas: Dallas (214) 688-0074.

11 / BLUE 58
A COMPACT
LSI-11/PDP-11
PERIPHERAL
W/TU58-BB

Transduction

14761A Franklin Ave.
Tustin CA 92680
(714) 838-4742

Aussie Roots DP Mission in U.S. Soil

By Tim Scannell

CW Staff

SAN JOSE, Calif. — Australian Michael Roberts decided 10 years ago to focus his attention on bringing together companies "down under" by spreading the word on microcomputers and data communications. He recently expanded his mission by more than 6,000 miles, rooting his goals in U.S. soil.

Far from being a modern-day corporate evangelist, Roberts is president and chief executive officer of ECS Microsystems, Australia's leading communications systems builder and a serious contender in the European DP market. In October, the firm plunged into the U.S. arena by es-

tablishing its international manufacturing and marketing headquarters here, right in the heart of Silicon Valley.

ECS deals in microcomputer-based, integrated hardware/software packages that plug into and emulate large mainframes such as IBM, Honeywell, Inc. and Burroughs Corp. machines, Roberts said. So far, the firm has sold about 3,500 systems throughout Australia and Europe, including some to a number of government agencies and to such communications giants as Telecom — the Australian equivalent of Ma Bell.

In fact, one of the company's first jobs was to put more than 300 Aussie stock brokers on-line with the Melbourne

Stock Exchange, a feat accomplished by harmonizing the activities of several Digital Equipment Corp. PDP-10s and PDP-8s.

New Challenges

But things have become "too easy" in Australia, Roberts joked, and the shift to the U.S. offers new challenges and goals.

In Australia, the DP market is fragmented and "we have to go all the way from word processing applications, to newspaper publishing, to on-line terminal systems, to stand-alone systems," ECS' president explained. But in the U.S., "I think we've got the luxury of saying

(Continued on Page 76)

Financing for the 1980s: Two Views

• Unstable Decade Ahead

NEWTON, Mass. — A prime rate in excess of 15% may not seem so high when compared to a 13% annual inflation rate or when it permits a company to survive, Peter H. McCormick, president of the New England Merchants National Bank, suggested here recently.

Along with high interest rates, McCormick predicted the 1980s would be an unstable and uncertain decade and told financial managers attending a recent American Electronics Association meeting here that planning is the best weapon for combatting uncertainty.

However, aside from the best-planned belt-tightening maneuvers — such as discontinuing unprofitable product lines, using retained earnings for financing, tightening inventory control and collecting receivables more efficiently — McCormick sees commercial lenders as inevitable and primary sources of long- and short-term capital for most companies.

The key to borrowing is "how much risk a company is willing to accept," McCormick stressed. A company cannot plan unless it adopts a "viewpoint on the fu-

(Continued on Page 70)

• Venture Investment Up

By Marcia Blumenthal

CW Staff

NEWTON, Mass. — Despite on-going predictions of a recession, investors have committed \$1 billion in new venture capital during the last 18 months, and today there are 30% more venture investment firms operating than during the 1973-1975 recession period, venture capitalist William H. Congleton noted here recently.

"Today \$4 billion is at work in the venture capital industry," according to Congleton, cofounder and general partner of the Palmer Organization, a private venture

firm.

The number of competent people seeking venture capital has increased significantly, Congleton said during a joint meeting of the American Electronics Association (AEA) and the New England Venture Capital Association.

Contributing to the healthy outlook for the venture capital investment market is the U.S. government's recognition that business — in particular, smaller innovative firms — must be stimulated to ensure growth in the stagnating economy.

The passage of the Steiger-Hansen Act last year, which reduced the maximum capital gains tax rate from 48% to 25%, is evidence of the government's recognition of the need for business stimulation and has prompted investors to commit funds for venture capital, Congleton maintained.

Right now a bill is under discussion in Congress that would defer the payments on capital gains earned from investments in smaller companies.

Encouraging Signs

In addition, Congleton pointed to other encouraging signs for the venture market. One of these is the increased funneling of funds into venture firms not only by traditional investors, but also

(Continued on Page 70)

Itel Transfers Lease Underwriting

SAN FRANCISCO — As part of its financial solvency program, which involves paring down business to bare-bones capital equipment leasing, Itel Corp. has signed an agreement transferring its capital equipment lease underwriting business to several of its employees.

These employees are forming TXL Corp., which will begin operations on Jan. 1. The terms of the transaction were not disclosed.

Robert Bishop and Mike Buchanan are the principals in the new firm.

The lease underwriting portion of Itel's business is relatively small, accounting for only 4.5% of the firm's total revenues in the first three quarters of 1979, a spokeswoman said.

Lease underwriting involves putting together all the parts of a tax leverage leasing program. In many cases, the lease underwriter takes an order position for the equipment, but does not ultimately hold an equity position in the equipment once it is placed.

However, Itel will continue its operating lease program, now concentrated in capital equipment for the transportation industry.

Although out of the plug-compatible computer business since transferring that activity to National Semiconductor Corp.

on Oct. 1, Itel will continue to re-market IBM systems now coming off leases. Prior to starting its IBM-compatible Advanced Systems line in 1976, Itel marketed IBM equipment.

In addition, Itel is still in the process of divesting its four or five remaining computer service enterprises.

Substantial Loss

As expected, Itel reported a substantial loss for its third quarter. That loss totaled \$176.1 million, bringing the nine-month loss to \$226.2 million.

Revenue for the third quarter totaled \$136.2 million, with nine

month revenues reaching \$460.5 million.

In commenting on the company's performance, Thomas S. Tan, Itel president and chief operating officer, said the losses were impacted by "writing down computer-related assets to their anticipated liquidation value" and the creation of a reserve for other parts of the business the firm intends to discontinue.

The firm will file claims of about \$200 million with Lloyd's of London in connection with its computer leases. To date, the firm said, it has filed \$8 million worth of claims.

Magnuson Launches Expansion

SANTA CLARA, Calif. — Magnuson Systems Corp. has started an expansion program that will result in the doubling of its manufacturing space this month.

In addition, the firm has ended its six-month search for a marketing chief with the hiring of Jerry Burke.

Magnuson has leased a new 75,000 sq-ft manufacturing facility in North San Jose. The firm, with about 60 manufacturing employees, is operating at full capacity at its current headquarters, President Joseph L. Hitt

said.

Next summer, Magnuson's administrative and engineering staffs will move to a 50,000 sq-ft area in the same complex.

The expansion is a direct response to the increasing demand for the company's M80 IBM-compatible processors, Hitt said. To date, the firm has installed 50 systems and is shipping 10 units per month.

Although sales are not as high as the company would like, Hitt said the expanded manufacturing capacity is necessary at this time.

In announcing the appointment

of Burke as vice-president marketing, Hitt said he had been looking for someone "who'd been in the trenches selling against IBM." Hitt was committed to taking as long as necessary to find the right person, he added.

For the past six-and-one-half years, Burke was vice-president of western operations for Univac.

In another move, Hitt appointed Peter W. Cassady vice-president of Magnuson's western operations. Cassady was previously the Western sales manager for Control Data Corp.

COMPUTER INDUSTRY

Office Micrographics to Grow

WALTHAM, Mass. — Micrographics will account for an increasing share of the automated office market, a study by International Data Corp. (IDC) has predicted.

Computer-assisted micrographic retrieval will increase 87%, word processors outputting to computer output microfilm (COM) will grow 85%, the merging of text and graphics on micrographics will grow a reported 74% and electronic mail outputting to COM will expand by 94% over the next two years, according to the report.

The growth can be attributed to the increasing sophistication of the current user of information-handling equipment. That user is beginning to demand the ability to

interface micrographics with other office equipment, according to IDC, which estimated that the automated office market will be worth \$16 billion by 1985.

IDC also forecast that micrographics will account for a significant portion of the dollars spent on hardware, software and related media.

Entitled "Micrographics in the Office: A Market Study," the report also includes several case studies that detail how some organizations have automated their offices and interfaced various information handling technologies.

The 80-page market survey costs \$400 from IDC at 214 Third Ave., Waltham, Mass. 02254.

Decade of Uncertainty Ahead for Financiers

(Continued from Page 69)
ture." Most financial managers are "posturing" their companies to operate in an unstable environment during the 1980s.

While borrowing may be inevitable, McCormick jocularly suggested that the banking industry has become so competitive that "the chance of finding a stupider bank down the street or one that will haggle with you is pretty good."

Despite the inevitability of bank borrowing, some government programs are boons to small or medium-size businesses, Peter Maher, senior vice-president of the State Street Bank, contended.

Industrial Revenue Bonds under the Internal Revenue Service allow a company to issue tax-exempt bonds as long as the funds derived from the sale of these bonds are used for capital expansion, which in turn creates jobs.

The cost of borrowing for a company issuing these bonds figures out to about 9% to 10% annually, Maher said. Interestingly, in the past 12 months, 160 preliminary certifications valued at \$350 million have been made for this class of bonds.

Relatively few hitches accompany these bonds, but because of the mechanics involved, Maher urged electronics executives to "have the best armed counsel you can — and corporate lawyers are not necessarily the best [for this transaction]."

The ceiling on these bonds is \$10 million, and they must be certified by a government municipality.

In addition to Industrial Revenue Bonds, the government operates several loan guarantee programs.

One of these is the Economic Development Administration loan guarantees for companies in high unemployment areas. Ninety percent of Massachusetts, one of the country's high technology capitals, qualifies, Maher said.

Investment Up In New Ventures

(Continued from Page 69)

by newer entrants such as pension funds and educational institutions. Another bright sign in the renewed interest in growth companies by investment analysts.

Most newcomers seeking venture capital are veterans of larger firms, where they have had excellent training and are therefore apt to be looked upon favorably by venture capitalists.

On the Upswing

The majority of the capital committed by venture capital firms is for expansions, but company start-ups and early phase financing are on the upswing, Congleton said.

When questioned by AEA members on whether venture firms are increasingly committing funds as medium-term loans as opposed to equity financing, Congleton noted that most financing still tends to be in the form of equity.

Check the charts. WANG beats IBM.

IBM recently announced two new computer systems, the IBM 4331 and 4341. We suggest you take a careful look at both of them.

Because that way, you'll appreciate Wang's remarkable VS computer family and the new VS 100 processors that much more.

Here are some of the things you'll appreciate most:

Major industry analysts consider Wang's VS systems more advanced than IBM's 4331 and 4341.

The VS family provides a completely integrated approach to computing with word processing, data processing and telecommunications, all available on the same system.

Wang's VS computers deliver the highest degree of programmer productivity of any system.

The VS has a high degree of compatibility with IBM 370 application software — even higher than IBM products like the System 38 and 8100.

	WANG VS	IBM 4331	IBM 4341	WANG VS 100
Price	\$37,000 (512K CPU)	\$65,000 (512K CPU)	\$245,000 (2MEG CPU)	\$93,000 (1MEG CPU)
Performance Index	1.0	1.1	3.7	6.0
Comparable IBM System	138	138	148	158
Operating System	Multi-User Interactive	BATCH	BATCH	Multi-User Interactive
System Expandability	DP, WP, TP	DP, TP	DP, TP	DP, WP, TP
Cache Memory	N/A	8K Bytes	8K Bytes	32K Bytes
Memory Range	128K – 512K	512K – 1 MEG	2 MEG – 4 MEG	256K – 2 MEG
On-Line Disk Storage	2.3 Billion Bytes	9 Billion Bytes	16 Billion Bytes	4.6 Billion Bytes
Delivery Date	10 Weeks	1-2 Years	1-2 Years	12 Months

VS interactivity is the highest of any system. That's right, any system.

The VS is extremely easy to use. Any programmer familiar with IBM 370 procedure can become productive in a single day. Even clerks or supervisors with no computer experience become productive within a matter of hours.

The VS can grow from the level of a System 34 to that of a 370/158 — without reprogramming, without major equipment swap outs. No other system can do that.

If you'd like to know more about the Wang VS family, including the new VS 100 processor, call us in Lowell, MA, at (617) 459-5000. Or send in the coupon below.

And we'll continue this chart-to-chart talk.

<input type="checkbox"/> I'm interested in the VS. Tell me more.	DP83/CW128
Name _____	
Company _____	
Position _____	
Address _____	
City _____ State _____ Zip _____	
Tel # _____	Send to: Wang Laboratories One Industrial Avenue, Lowell, MA 01851 (617) 459-5000
WANG	

WANG

Making the world more productive.

*Industry Analysis Report for Executives. Advanced Computer Techniques Corporation, New York, New York.

ALL MODELS
TELE TYPE
43
1-DAY SHIPMENT
LEASE from 90 DAYS
NEW • ASR PAPER TAPE
• BSR 16K BUFFER
CALL
617-261-2700
A AMERICAN
TERMINAL LEASING
1000 KENMORE ST. BOSTON, MA 02111

"How can PRIME help you decentralize computer power and stay in control?"

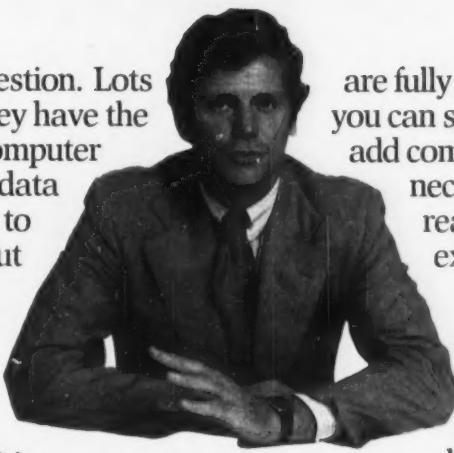
"That's a tough question. Lots of companies claim they have the technology to move computer power away from the data processing center, out to where the action is. But technology isn't the whole answer: when you start building a new computer network, you don't want to destroy the capabilities you already have. And you don't want to limit future growth.

Control When You Start

"I think we've succeeded at Prime by answering the tough questions effectively. For example, for years we've had a low-risk approach that lets you ease into networking by adding Prime computers to your existing systems. Without disrupting ongoing work. Our computers can communicate with IBM, Honeywell, Control Data, ICL and Univac systems. And your existing 3270 terminals can run exactly the same programs on Prime and IBM computers.

Control As You Grow

"We've also cut the risks of growth. All Prime computers, from remote-site processors to central systems with mainframe capabilities,



*Russell Planitzer, Vice President,
Marketing Development, Prime Computer*

are fully compatible. So that means you can start with one system, upgrade, add computers and terminals, connect or reconfigure when you're ready. And without sacrificing existing software.

Technological Leadership

"Better technology cuts risk too. We offer the most advanced networking products available, like our industry-standard X.25 software package that lets you plug into packet-switching networks worldwide. And PRIMENET,™ our remarkably flexible networking software 'umbrella.'

"I've given you part of our answer to a tough question; there's a lot more in our distributed processing brochure. For a copy, call us at 800-528-6050, x 1456 (in Arizona, 800-352-0458, x 1456) or write Prime Computer, Dept. 5310, 3 Newton Executive Park, Newton, MA 02162."



PRIME® Computer
Better answers to the tough questions.

A computer system is only as good as its terminal

Without easy-to-use, flexible terminals, even the smartest computer can act pretty dumb.

At Hewlett-Packard, we've designed display stations, printers, and plotters that can make almost any system better, no matter what the application. Need clear, easy-to-read alphanumerics? Graphics without graphics software? We've got them. Data capture devices or high-speed printouts? Just choose the terminal that's right for you.

Intelligent Graphics Terminal

Our top-of-the-line HP 2647A has a Multi-Plot feature that lets you plot your tabular data in a variety of formats without writing any software. Or, for more sophisticated applications, you can program the terminal using simple, English-like commands in AGL, our graphics extension of BASIC.

Interactive Terminal/Printer

The easy-to-use HP 2621 interactive terminals have typewriter-like keyboards with control keys labeled right on the screen for self-test, configuration, display and editing. And with just a key-stroke, the 2621P's built-in thermal printer will deliver a printout from the screen in seconds.

Interactive Graphics Terminal

The high-performance HP 2648A lets you plot tabular data without writing any host CPU software. It combines full alphanumerics and graphics capabilities, including autoplot, raster scan, area shading and rubber bandline.

Interactive Display Station

The HP 2645A is the smartest of our alphanumeric terminals. Microprocessor control provides easy editing, scrolling and forms-building capability, and special user-definable "softkeys" streamline repetitive jobs. Optional dual cartridge tapes provide up to 110K bytes of storage each.



Impact Printers

Hard copy is easy with our microprocessor-controlled HP 2635 Printing Terminal and 2631 Printer. The easy-to-read 7 x 9 dot matrix meets the 128-character ASCII Standard, allows true underlining and descenders, and prints six-part forms. The 2631G model even prints graphics output from HP 2647/48 terminals.

Both the 2635 and 2631 zip along at 180 cps in both directions. The microprocessor determines the optimum print path, and a high-speed slew speeds up printing columnar data.

Good as the terminals it supports.

Most HP terminals are compatible with major interface standards and work with computers from a wide range of manufacturers. And they come with full HP support, service, and documentation.

Want to get the complete story on just how good our terminals are? Call your nearest HP office listed in the White Pages and ask for details. Or mail us the coupon below and we'll be glad to send you more information.

Data Capture Devices

Designed for easy operation by plant personnel, the table-top HP 3075A and wall-mounted HP 3076A terminals can be configured for applications like job or product status tracking, labor data reporting, and work-in-progress monitoring.

The HP 3077A time reporting terminal has a built-in clock/display and punched badge reader for time and attendance applications.

Graphics Plotter

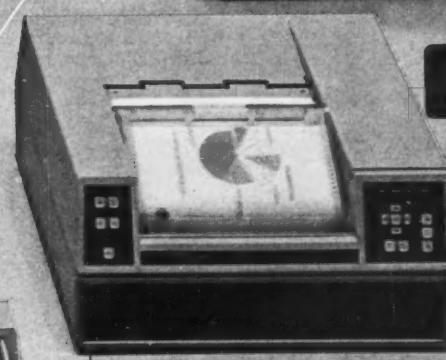
The HP 7225A offers a cost-effective approach to professional hard copy graphics. By changing a plug-in module, the 7225A will provide the appropriate interface, language, and graphics capabilities for a variety of computer and instrument systems.

Thermal Plotter/Printer

The desktop HP 7245A uses a thin-film head to produce quality graphics, clean printing and flexible labeling. There are two printing speeds (19 and 38 cps) in four orthogonal directions, and drawn characters may be programmed for size, slant, direction and placement.

Multicolor Graphics Plotter

The microprocessor-based HP 9872A plotter produces high-quality, multicolored graphic plots on charts up to 280x432 mm. It has five built-in character sets, with labeling, point digitizing, character sizing and window plotting capabilities.



**HEWLETT
PACKARD**

Please send me your literature on HP's family of terminals.
 Please send me additional information on the following products:

Name _____

Title _____

Company _____

Address _____

City _____

State _____

Zip _____

Phone _____

Mail to: Hewlett-Packard, Attn: Ed Hayes, Dept 353,
19400 Homestead Road, Cupertino, CA 95014.

Insac Restructuring

LONDON — Because of a growing interest in Viewdata-related products, the National Enterprise Board (NEB) here will restructure its wholly owned subsidiary, Insac.

Insac was originally formed by the NEB in 1977 to invest in software products developed by selected British software firms and to assist these firms in exporting their products. However, over the past two years Insac has identified significant opportunities in Viewdata products and has been building up a successful business in this market, the NEB said.

Viewdata is one of the generic terms for an

interactive data base retrieval system that displays a wide variety of information — stored in a computerized central data base — on a TV screen located in the user's home or place of business.

Both the still-to-be-named Viewdata company and the software company will remain 100% owned by the NEB and will be funded from the \$43.2 million allocated by the NEB for investment in software activities.

John Pearce, managing director of Insac, will head up the Viewdata company. Neil Pearce, director of Insac operations, will become managing director of Insac.

Mini Users Seen Budgeting \$69,000 for '80 Software

WALTHAM, Mass. — Average software budgets at mini-computer sites will increase to \$69,000 by 1980, up from \$48,000 last year, according to statistics gathered by International Data Corp. (IDC) here.

Large amounts of money — as much as \$310,000 — are spent by strictly minicomputer installations. Although nearly 80% is currently spent in-house, most users would

like to spend more with outside sources, IDC learned.

Development and maintenance of applications software make up the bulk of the internal expenditures. A greater percentage of the external money is spent with custom consultants than with hardware vendors or with independent vendors of packaged software.

This trend, according to IDC, will continue through 1980. The research firm predicted that more dollars will be spent with both custom consultants and hardware vendors than with packaged software vendors.

IDC research also found a degree of correlation between software spending and the number and size of the CPUs at any given site. Software spending appears to increase dramatically when measured by single vs. multiple CPUs, but does not increase proportionately with the addition of each CPU, according to IDC.

IDC's survey included 91 users whose software budgets ranged from less than \$20,000 to more than \$75,000.

The research results can be obtained for \$395 from IDC in its research brief entitled "Software Spending Patterns of Minicomputer Users." IDC is at 214 Third Ave., Waltham, Mass. 02254.

If our system 34 matrix printer is 60% faster and uses 40% less paper, is it 100% better?

When you compare our Memorex® 2056 Matrix Printer to the IBM 5256, the answer must be 'yes.' Not just for the System/34 but also for the 38.

Take speed, for example. Ours offers you a print speed of 200 characters per second, versus IBM's maximum 120 cps. You'll also get much better slew speeds with our model, for both printing head and paper movement. This means you can expect twice the throughput on average jobs.

Next, look at our savings on paper and on reduction copies. Because our print compression feature allows you to scale down the usual spread-out print area to an 8½" x 11" format, you use 40% less paper (or you can put more data into the same area). And you eliminate reducing printouts on your copying machines. As a result, your overall cost savings can be quite dramatic with the 2056.

And there's much more. In operating features, convenience, print quality and pricing, our 2056 is clearly the one to beat. Cable-through and pedestal mount, for example, are standard. And in underlining, our 9-pin

print head does it clearly, without hitting the descenders. Our control panel is similar to the 5256, so your operator won't have to adjust to a new set-up. And this print mechanism has already been proven in more than 5,000 installations.

To see whether we can improve your printing applications 100%, contact us today: Memorex, Business Systems Division, 3015 Daimler Street, Santa Ana, California 92705. Call toll-free (800) 854-3111; or in California (714) 549-9961; ask for Stan Tomsic.

The Memorex 2056 Matrix Printer	The IBM 5256 Matrix Printer
PRINT SPEED	200 CPS, Bidirectional
PAPER SLEW	20 IPS
HORIZONTAL SPACING	10 or 16.5 CPI
PAPER LOADING	Bottom and Rear
CABLE-THROUGH	Standard
UNDERLINE	No run-in with character descenders
MOUNTING	Pedestal and Paper Basket (standard)
	Pedestal not available. Paper Basket optional



MEMOREX
Business Systems Division
More Power to you

Supershorts

GRI Computer Corp. is offering distributorships for its Grip systems, which are targeted for first-time users in the specialty manufacturing market.

The GRI agreement features discounts up to 40% on systems that sell in the \$16,000 to \$24,000 range; 70% of maintenance fees; buy-out provisions; packaged training; and built-in promotion programs at no charge. Deliveries are currently scheduled at 60 days, the firm said from 320 Needham St., Newton, Mass. 02164.

— — —

Prime Computer, Inc. has appointed Turnkey Sales & Leasing, Inc. as an authorized dealer for its Information Systems in the greater New York area.

**A
KD** HOTLINE
for INSTANT QUOTES



Omaha
(800) 228-9410

**AMERICAN
KEY DATA**
Mid America Plaza, Suite 144
7171 Mercy Rd., Omaha, Ne. 68106

The number one rated service team is now playing in the National league.

When you have a winning team you don't want to start changing things. That's why we kept the service and support force intact when Itel's Data Products Group became a part of National Semiconductor.

According to Datapro*, an independent research organization, our service and support force comes out number one in overall customer satisfaction. We're also number one in reliability of maintenance, number one in technical support, and number one in ease of conversion.

Who argues with success.

We've got a good thing going and we're going to keep it that way. Your Itel salesperson, support consultant, and service representative are now part of the National Advanced Systems team. And they'll keep on giving you the same recognition-earning

attention they always have.

National will continue all previous Itel service and support functions for the Advanced Systems and peripheral products. This commitment exists not only for the sale of new equipment, but also for on-going maintenance, spares, and engineering changes.

We're going all the way.

Our goal is to build National Advanced Systems into a full-line computer company. We know service and maintenance are one giant step in the process, but we also have to deliver reliable equipment at the forefront of technology. That's where National's expertise comes in. We're not only a

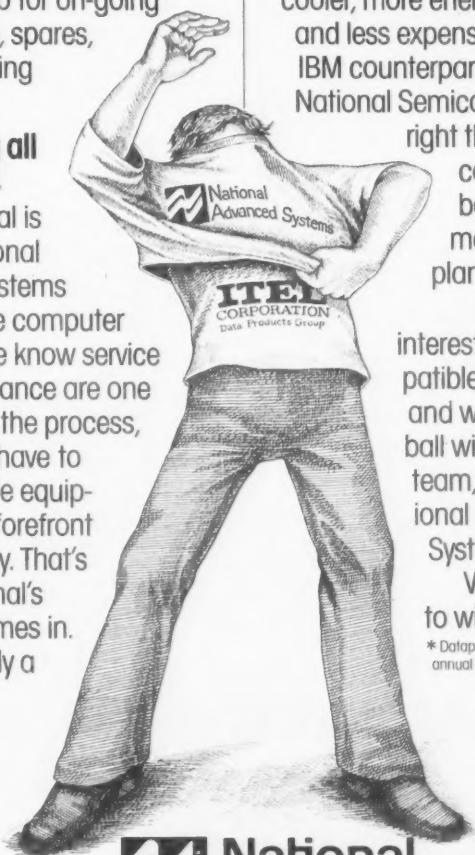
leader in semiconductors, we've used that expertise to build more compatible mainframes than any other independent manufacturer.

We know how to build compatible computers smaller, cooler, more energy-efficient and less expensive than their IBM counterparts. And National Semiconductor is right there with the committed backing to make all our plans come true.

So if you're interested in compatible systems and want to play ball with a great team, contact National Advanced Systems.

We're out to win.

* Datapro Research Corporation's annual survey/1979.



National Advanced Systems

The Compatible Computer Company.

National Advanced System is a subsidiary of National Semiconductor.

Acquisitions, Mergers in Services Completed

In keeping with a growing trend in the services industry, three firms recently completed mergers or acquisitions.

Comshare, Inc. will acquire all the common stock of Computer Research Co. (CRC) effective Jan. 1, 1980. Comshare paid a \$3.75 million down payment for CRC and will make additional payments during the next two years amounting to no more than \$1.25 million.

In commenting on the purchase, Richard P. Eidswick, Comshare senior vice-president, said the acquisition of CRC will "strengthen Comshare's staff, equipment and software expertise in large-scale IBM computers."

In addition, the move will bring Comshare a client base enabling it to profitably expand into new product areas based on IBM technology, he said.

Prior to the acquisitions, 21% of Comshare's U.S. revenues was derived from processing services performed on IBM systems. CRC, with current revenues of \$7 million annually, operates remote computing services using IBM 370/168 and 3033 processors.

On the West Coast, Hale Brothers Associates, Inc. of San Francisco has acquired

Remote Computing Corp. of Palo Alto, Calif. The move is part of Hale Brothers corporate expansion program that began three years ago to build a company in the computer services and communications field, Richard Pershing, the firm's president, said. Prior to this effort, Hale Brothers was a venture capital firm specializing in high technology companies.

Remote, with annual revenues of more than \$12 million, offers a range of services to the thrift, mortgage and investment industries nationally and operates two Burroughs computer centers: one in New York and one in Palo Alto.

Hale Brothers has four other subsidiaries: Computer Election Systems, Datron, Lightweight Processing Co. and Prospect Properties, offering

services to government agencies and to the construction and real estate markets.

Terms of the transaction were not disclosed.

In another move, KRS Systems Corp. of Westport, Conn., and TSA Software, Inc. of Monroe, Conn., have merged, forming a new company, Infosoft Systems, Inc.

KRS Systems, a Data Gen-

eral Corp. OEM, developed a major portion of the nationwide reservation systems used by the Sheraton hotel chain, in addition to creating custom software for on-line applications for DG minis, according to Kenneth R. Short, president of the newly merged firm.

TSA, a year-old firm, specializes in consulting services and the development of microcomputer software.

Aussie Roots DP Mission in U.S.

(Continued from Page 69)
"let's just start by doing one particular thing... and do it really well."

According to Roberts, that "thing" is data communications — linking businesses and businesspeople with networks of microcomputer systems.

"The idea is to access the great amounts of data that big name firms have been accumulating all these years and to get it out into small machines on an executive's desk," he explained. That way, they "can access it, quickly process it and quickly get their reports out."

To kick off its American venture, ECS opened a \$3.5 million, 48,000 sq-ft facility in San Jose and hopes to have it

fully operational and staffed with about 200 people by the beginning of next year.

In addition, by the fall of 1980, Roberts plans to have at least six sales and service offices scattered throughout California and will boost his initial work force by another 50 employees.

Presently, by comparison, the firm's Australian operations has about 150 workers.

Not one to shirk an executive challenge, ECS' determined president will head the U.S. plant himself — aided, at first, by a few of his Australian colleagues. Eventually, however, the facility will be totally staffed by U.S. employees.

While Roberts isn't turning his back on his Australian

parent operations — ECS is opening a second plant this July in Sidney — he has made San Jose his headquarters rather than just a subsidiary or corporate arm. Part of the reason for this move is the general availability of computer parts in the U.S. compared with supplies down under, he pointed out.

Working from Australia, ECS workers have to schedule deliveries a year in advance, engage in extremely careful inventory management and sometimes wait months for needed parts because of the shipping distances. In addition, parts are a bit more expensive with all of the added freight charges, import taxes and distributor fees, Roberts said.

"It sounds like a small thing, but when you put all of those factors together over something like 300 components, it becomes continuous aggravation that we just don't need," he commented.

On the other hand, if ECS' American plant happens to run short of a specific part, "all we have to do is get in a van, run up to the local supplier and get some," Roberts added, describing the Silicon Valley area as an "electronics mecca." Being closer will make us much quicker on our feet."

Roberts noted that other locations, such as Shannon, Ireland and Singapore, were seriously considered as potential homes for the new headquarters.

Marketing Formula

Besides building and peddling end-user and OEM systems — which are not only functional but have also won a number of design awards and

certificates of merit in Australia and Europe — ECS will also transplant what it thinks is a sure-fire formula for marketing success.

Technically, the Australians are on a par with the rest of the world, but they tend to have a more intuitive and generalized approach to marketing than their contemporaries in the U.S., Roberts stated.

The Americans have an almost scientific approach to selling, he added. However, by mixing the Aussie's intuition with the American's marketing science, ECS hopes to take the communications systems market by storm.

The formula seems to work. ECS sold 10 of its systems to a major U.S. customer within the first few weeks of business, and the company plans a number of product introductions in the near future.

JESTEEL FORMS CADDY

It handles your forms instead of you handling them. It changes forms fast — does away with heavy lifting. Perfect for handling payroll, invoices, work orders, etc.

ROLL THE FORMS CADDY WHERE NEEDED — FROM PRINTER TO PRINTER, FROM DEPARTMENT TO DEPARTMENT.

Two models — two convenient sizes

Model 914
Size (outside): 9 1/4" W. x 16 1/2" L.
Size (inside): 9" W. x 15 3/4" L.



Model 1114
Size (outside): 13" W. x 22 3/4" L.
Size (inside): 12 1/4" W. x 15 1/4" L.

Model 1114S (not shown) For IBM Systems
Size (outside): 13" W. x 16 1/2" L.
Size (inside): 12 1/4" W. x 15 1/4" L.

- Every FORMS CADDY guaranteed for 5 years.
- Built tough for tough work.
- 2 1/2" chrome ball casters roll on any surface.
- Beautiful beige-tan enamel finish.

SEE OTHER SIDE
FOR NO-RISK SPECIAL OFFER...

Special
no-risk

INTRODUCTORY OFFER

Try the FORMS CADDY for 10 days. If you do not agree it is the greatest labor saving device since forms were introduced, return it to us for credit or refund. As a special bonus offer — we will pay shipping and handling charges to you on your first order.

SPECIAL PRICE OFFER

Model 1114/1114S

\$46.50 Ea.
2 for **\$90.00**

\$42.25 Ea.
2 for **\$82.00**

Model 914



SEND IN YOUR ORDER TODAY OUR SPECIAL NO-RISK 10-DAY FREE TRIAL OFFER MEANS YOU MUST BE SATISFIED
TEL: (212) 497-4004 / CALL TOLL FREE OUTSIDE NEW YORK 800-221-0936
JESTEEL BUSINESS EQUIPMENT CORP. / 1345 Halsey St., Brooklyn, N.Y. 11227

**EDP
DISASTER PLAN
METHODOLOGY**

What you need to implement and test a Disaster Plan — Gives you tasks, procedures and guidelines

EDP Security, Inc.
400-2 Totten Pond Road
Waltham, MA 02154
617-890-6374

**MEMORY
REPAIR**

CORE AND SEMI PRODUCTS

COMPUTER AUTOMATION
MEMORIES
NOVA 2, 3, 800 and 1200
AMPEX
E. M. & M.
DEC PDP 11, 8, 10
PLESSEY

Fast Top Quality & Reasonable Rates

* a trademark for Data General

INTREGAL SYSTEMS
14315 So. Normandie Ave. Suite 400
Gardena, CA 90247
(213) 538-9020

"It's For You."

Software AG Names Three

RESTON, Va. — In response to an annual growth rate of 70% during the past two years, Software AG of North America, Inc. has formed a Consulting Division and made several executive appointments.

Kenneth D. Rardin has been promoted to executive vice-president. Prior to this he served as senior vice-president in charge of technical operations and marketing support. He was responsible for the development of Software AG's Com-Plete teleprocessing system.

In addition to Rardin, Edward J. Forman was named vice-president of technical operations and Steve Greaves has been promoted to vice-president of development.

Colin Moore is the head of the new Consulting Division.

Executive Corner

Other Moves

- Robert T. Wall has been appointed vice-president of finance and administration and chief financial officer at Cipher Data Products, Inc.
- Art Withop has been named director of engineering for Magnex Corp., Inc.
- Max P. Beere has joined Imperial Computer Services, Inc. as vice-president of the Consulting Group.
- Ray H. Fentress has been appointed vice-president of marketing for Satellite Business Systems.
- Kenneth W. Simonds has been named senior vice-president of U.S. field operations for Amdahl Corp.
- Stanley Jones has been elected vice-president of employee and industrial relations at Burroughs Corp.
- J. Ben Ryan has joined American Satellite Corp. as assistant vice-president for general services marketing.
- Carl H. Carlson has been named vice-president of operations at Apple Computer, Inc.
- Dr. Arthur J. Schneider has been named staff vice-president of the Sperry Research Center.
- Ralph W. Lowry has been appointed vice-president of product marketing and international marketing at Intertel.
- Walter R. Jonsson has been appointed assistant vice-president of international sales for T-Bar, Inc.
- Herbert F. Morrow has been promoted from sales manager to vice-president of sales at Yourdon, Inc.
- Alan R. Risley has been appointed an international regional manager for Datel-Intersil.

Bradford to Develop Trust System

NEW YORK — Bradford Services, Inc. has signed a long-term agreement to provide Canada's National trust Co., Ltd. with a computerized trust information system.

"When the network is fully operational, cost savings are conservatively estimated at \$2.8 million annually. The development expense will be fully recaptured before the total system is on-line," Robert D. Dexter, assistant comptroller

of National Trust, said.

Designed by National Trust, the system will be programmed, documented and tested by Bradford in three phases. It will involve more than 80,000 trust accounts and enable National Trust to deliver fully integrated trust accounting, asset management and cash control services to clients.

Although no monetary value was put on the contract, the

agreement could extend up to six years, a spokesman said.

Spanning four time zones,

Contracts

the trans-Canadian computer system will compensate for differences in language, tax structures, monetary values and securities pricing in Canadian and U.S. securities markets.

Other Awards

General Electric Co. and Memorex Corp. have entered into a four-year contract under which Memorex will purchase Terminate 200 matrix line printers from GE's Data Communication Products Department.

Sweda International has received a contract for 50 Model L-45 electronic cash registers from Playboy Clubs International of Chicago.

As Computerworld looks back at the 70's and ahead to the 80's in our Year End Wrap-Up Issue.

According to E. Drake Lundell, Jr., editor of Computerworld, this special decade-ending Wrap-Up Issue is "designed to be read thoroughly, not just glossed over and shelved." We'll do this by focusing on six major topics of current high interest to users, with selected industry experts covering each topic. One expert will look back a decade, and another will write on the future. Here are the details.

Technology — As the (by now) well known saying goes, "If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost \$2.50 and get 2,000,000 miles per gallon." We won't go back 30 years, but one of our experts will look back at the 70's, while another will look ahead to the 80's and what we can expect in the way of technological changes and their impact on data processing.

Minicomputers — Did you know that Computer Control Corporation was the world's leading minicomputer company back in 1970? Do you know what happened to them? The minicomputer has come a long way in the last ten years. One of our industry experts will look at how far it has come, while another will examine its future.

Medium to Large Systems — We've gone from tubes to transistors to large scale integration to very large scale integration. And the changes have been dramatic. Our experts will look at both the past decade and the coming decade to show you just how dramatic those changes have been.

Software — Nothing in the computer industry has been the butt of more jokes than "software" and all the images that word conjures up. But as we've all come to know, "software makes hardware happen" — and it will be increasingly important in the next decade. We'll also look at its development through the past ten years.

DP Operations — In 1970, "distributed data processing" was unheard of. Large central systems were the order of the day. We still have large centers of course, but we have a lot of other things as well. As DP has become a more integral part of the organizations it serves, DP Operations have become much more complex. Experts will look at both the past and the future.

Communications — It wasn't very long ago that the key to computer communications was the person who carried the punch cards from one office to another. So there's a lot of change to review — and a lot more to come in the 80's. Two experts will look at this aspect of data processing.

PLUS

... We'll have short articles from industry leaders, both old-timers and young up-and-comers ... and we'll take a humorous look at some of the predictions the experts were making back in the 70's and how they came out. (We'll also look at some predictions that were missed, like the microcomputer explosion.)

This could be the most important issue of Computerworld this year. If you want to find out what has been so you can better guess what will be; don't miss our December 31st issue. And if you market products or services in the computer field, you'll want your ad there. Closing date is December 14th. Your Computerworld representative can give you complete assistance in ad planning. Or, to reserve space for your ad, call Frank Collins at (617) 965-5800.



COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Boston

Bob Ziegel
Chris Lee
Ed Marecki
Kathy Doyle
(617) 965-5800

Chicago

Tom Knorr, Jr.
Bob Ziegel
Jane Wrightman
(312) 782-7565

New York

Don Fagan
Mike Eisenkraft
Peter Senft
(201) 461-2575

San Francisco

Bill Healey
Ruth Gordon
(415) 421-7330

Los Angeles

Jim Richardson
Bob Hubbard
Kathie Knox
(213) 450-7181

HP Revenues Up 36%

PALO ALTO, Calif. — Hewlett-Packard Co. reported a 36% increase in revenues and a 33% increase in net earnings for fiscal 1979.

For the year, HP's revenues totaled \$2.35 billion compared with \$1.73 billion in 1978. Sales of data processing products totaled just over \$1 billion for the year, 42% more than last year, HP President and Chief Executive Officer John A. Young noted.

Earnings for the year were \$203 million or \$3.43 per share, up from \$153 million or \$2.63 per share a year ago. All earnings have been restated to reflect a two-for-one stock split on June 27.

Despite record earnings, net income as a percentage of sales

dropped from 8.9% in 1978 to 8.6% this year. Young explained that earnings, particularly those in the fourth quarter, were "impaired by greater-than-expected increases in material costs, including premium prices paid for components which are in short supply and for a higher than normal volume of subcontracting for fabricated parts."

Fourth-quarter earnings were up 8%, rising to \$56 million or 93 cents per share from \$52 million or 87 cents per share in the comparable period a year ago.

Revenues for the final quarter reached \$679 million, a 31% increase from revenues of \$517 million in the fourth quarter of 1978.

MAI Reports 33% Increase In Fiscal 1979 Revenues

NEW YORK — Management Assistance, Inc. (MAI) has reported year revenues of \$271.9 million, a 33% increase from the \$205.1 million reported in 1978.

Earnings for the year before extraordinary items totaled \$18.9 million or \$2.36 per share compared with earnings of \$16.2 million or \$2.06 per share in 1978. However, final 1979 earnings of \$29.2 million or \$3.66 per share reflect an extraordinary credit of \$10.4 million or \$1.30 per share.

MAI operates three subsidiaries: Basic/Four Corp., Sorbus, Inc. and Wordstream Corp.

The company's Basic/Four computer systems and maintenance product

lines were responsible for earnings increases both for the fourth quarter and for the year, MAI Chairman and President Raymond P. Kurshan said.

"The progress of our word processing program, however, continued to be slower than planned during the fourth quarter and had a negative impact on operating results throughout the year," he explained.

Revenues from Basic/Four represented 63% of MAI's total revenue, a 44% increase from 1978 levels. At fiscal year end, Basic/Four's order backlog was 5% above last year's. Moreover, revenues from the Sorbus subsidiary increased 29%, accounting for 26% of MAI's total revenues.

However, revenue from Wordstream word processing systems decreased 5%.

For its final quarter, MAI's revenues totaled \$80.3 million, up from \$58.2 million a year ago. Earnings before extraordinary items was \$5.3 million or 66 cents per share compared with \$4.6 million or 58 cents per share in the year-ago quarter.

For the quarter MAI recorded a tax-loss carryforward of \$1 million, which hiked total fourth-quarter earnings to \$6.4 million or 79 cents per share.

Xerox Permitted To Acquire WUI

WASHINGTON, D.C. — Xerox Corp. was granted permission by the Federal Communications Commission (FCC) Nov. 20 to acquire WUI, Inc., the holding company that owns Western Union International, Inc. (WUI), a major U.S. international record carrier (IRC). Under an agreement reached earlier, WUI stockholders will trade their stock for Xerox common shares worth approximately \$205 million.

The acquisition includes three other subsidiaries besides Western Union International. Cable & Wireless/Western Union International, Inc. provides international Telex, leased point-to-point, voice and TV services to Puerto Rico and the U.S. Virgin Islands. WUI-TAS, Inc. provides telephone answering and alarm monitoring services. Airsignal International, Inc. provides two-way mobile radio, paging, air-to-ground and rural radio services in 30 U.S. cities.

The commission approved the merger subject to five conditions.

IBM H-SERIES FORECAST

The Adirondack Range (IBM code name for H-Series models).

Marcy
Sentinel
Baldin
Incausis
Lockout
Catalin



The Technology Analysis Group - ACT

Yes, I'm interested in the H-Series Forecast. Please send more information.

Name _____

Title _____

Company _____

Address _____

Phone () _____

300 BAUD ACOUSTIC
TC-3006 COUPLER

Half or Full Duplex

EIA —
Originate
Only



\$149.50
DELIVERY
FROM
STOCK

1 Year
Warranty

vardon
& associates. inc.

930 N. Beltline • Irving, TX 75061

800/527-7700

...an exclusive report from
ADVANCED COMPUTER TECHNIQUES
437 Madison Ave.
New York, N.Y. 10022
(212) 421-4688

position announcements

position announcements

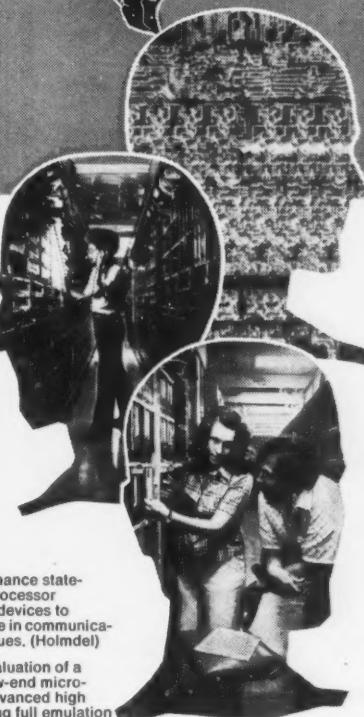
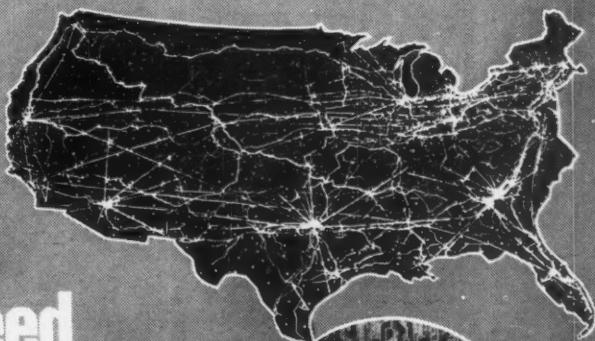
position announcements

position announcements

position announcements

ENGINEERS & SCIENTISTS

Innovative minds find the resources and intellectual stimulation they need ...at Bell Labs



The record speaks for itself. Bell Labs engineers and scientists have pioneered many of the major technical breakthroughs that have reshaped the modern world. We continue to advance the state-of-the-art on many fronts: LSI technology, innovative microprocessor applications, new approaches to computer hardware, software and systems architecture, to name a few. In part this is due to the environment we provide professionals. The engineer is not isolated here, and has freedom to pursue intellectual interests.

We offer career-oriented engineers and scientists the opportunity to take on responsibility for developing new products, new services, new tools and techniques for operating and maintaining the Bell System and its national network efficiently and economically.

You'll find the latest in computer equipment here, excellent libraries, strong technical support, and highly developed educational programs. Most important, your work will stimulate your professional creativity, productivity and personal growth.

If you hold an advanced degree in Computer Science, Electrical Engineering or other discipline relevant to the exciting field of telecommunications, or strong experience in any of the areas of work described, we want to hear from you. We offer salaries and benefits that rank among the best in the industry. These opportunities are available at our facilities in **Naperville, Illinois** and **Holmdel, New Jersey**.

Computer System Architecture ...

Design and analysis of computing systems architecture and Research and Development of related state-of-the-art software systems. Interdisciplinary skills in computer systems hardware, operating systems, language and data bases required. Distributed architectures are of particular interest. A working knowledge of caches, memory management, pipelining, instruction set design and VLSI processor architecture is desirable. (Naperville)

Processor Circuit Design ... Design, development and evaluation of central control circuitry for high availability general performance processors including initial design, circuit testability evaluation, simulation and analytical studies utilizing state-of-the-art technologies including advanced MOS microcomputers, custom MOS and bipolar VLSI components and gate array technologies. (Naperville)

VLSI Circuit Design ... Design of high performance state-of-the-art microcomputers, advanced integrated processor memory management chips and other exploratory devices to implement a line of fault-tolerant processors for use in communications. Involves use of advanced simulation techniques. (Holmdel)

Computer System Design ... Design and evaluation of a family of fault-tolerant processors ranging from low-end microprocessor/microcomputer based processors to advanced high performance microprogrammed machines providing full emulation capabilities. Processors as components of distributed systems are of special interest. Embraces conception through pilot model. (Naperville/Holmdel)

Digital Circuit Design ... Design of processor boards and processor sub-systems for VLSI implementation. Familiarity with processor concepts such as memory management, data cache, pipelining, system bus, bus arbitration and CPU characteristics and operations. (Naperville/Holmdel)

Please write stating your area of preferred specialization and geographic location. Include a resume and transcript. Direct it to: Director of Technical Employment, Bell Laboratories, Center 831-63, 600 Mountain Avenue, Murray Hill, N.J. 07974.

An equal opportunity employer.



Bell Laboratories

DIRECTOR COMPUTER SERVICES

A large academic health science center with a 538 bed teaching hospital located in the capital city of Jackson, the University of Mississippi Medical Center offers an opportunity for challenging growth in Computer Services. The Director, whose responsibilities are very broad in nature, ranging from development and operation of financial systems to support of teaching and research efforts and the improvement of patient accounting and health care delivery systems, assumes overall direction of computing activities for the medical center and coordination of daily activity of over forty employees. Along with the responsibility for working with user departments and the Center's computing processor, the Director is responsible for planning and controlling the operation and growth of the computer center. Director is responsible for planning and controlling an annual budget which exceeds 1.5 million dollars.

Requirements for this position are: Masters Degree in Computer Science, Business Administration or related field preferred. Eight years of progressively more responsible assignments in computer related positions. Experience as a manager or supervisor in computer environment. Strong preference for exposure to a wide range of application systems, including financial accounting, health care, testing and research. The successful candidate will possess very strong interpersonal skills and display effective written and verbal communication ability.

Salary is negotiable. Excellent working environment, fringe benefits and retirement plan. Send resume and salary requirements to:

Personnel Department, (801) 987-3844
The University of Mississippi Medical Center
2500 North State Street, Jackson, Mississippi 38216

DATA PROCESSING BEAT THE GAS CRUNCH

Work in beautiful uncrowded SE Idaho: minutes from work. Progressive data processing environment. Teleprocessing responsibility for several regional truck lines. Salaries competitive with metropolitan areas. Outdoor recreational opportunities close by.

TELEPROCESSING PROGRAMMERS

Desire approximately 2 yrs experience CICS/ALC. These people will design/code conversational teleprocessing programs. Direct access data management experience helpful.

SYSTEMS PROGRAMMER

OSVS-1 and CICS internals. Responsible for System Software and Technical Support.

Forward Resume to:

Norm Schiffman
GARRETT FREIGHTLINES, INC.
P.O. Box 4048
Pocatello, Idaho 83201

"An Equal Opportunity Employer"

PROGRAMMERS RICHMOND, VIRGINIA

Private expanding organization needs programmers with one or more years experience in Cobol.

Experience in following areas helpful:

- PMS insurance processing package
- Property & Casualty insurance processing
- ALC or RPGII
- DL/1 or VSAM
- CICS/VS & DMS/VS

Environment is medium size shop using DOS/VS, CICS/VS, DMS/VS On-line programming and other software on IBM 370/145 1 MEG System with 3350 disk. Utilizing local and remote CRT terminals.

Good benefit package. Salary to commensurate with experience and education. Some college preferred.

Send resume and salary history to:

Claude D. Busic
VIRGINIA FARM BUREAU
MUTUAL INSURANCE COMPANY
P.O. Box 27552, Richmond, VA. 23261
PHONE: (804) 788-1234
AN EQUAL OPPORTUNITY EMPLOYER

position announcements

position announcements

position announcements

position announcements

position announcements



PIPER AIRCRAFT

...committed to the future
and to becoming the leader
in general aviation.

We invite qualified personnel to help us accomplish this goal. We are looking for data processing professionals with manufacturing and financial systems background for our DP Facility in Lock Haven, Pennsylvania. We have the following positions available.

MGR, SYSTEMS PROGRAMMING SR. SYSTEMS ANALYST SR. PROGRAMMER

These positions require individuals experienced with COBOL and TOTAL languages to handle our new systems development. A BS degree along with MRP is helpful but not required. These positions not only offer competitive starting salaries and excellent benefits but can afford you the high visibility to management which ultimately means career advancement for achievers.

Our location provides the best in outdoor recreational activities plus the cultural and education opportunities of Penn State University. In addition, good schools, housing and a non-congested traffic free environment are extra pluses you will enjoy. Write us detailing your experience, interests, salary history and requirements. (Resumes will not be considered without this information).

Bruce Levy
**PIPER AIRCRAFT
CORPORATION**
Lock Haven, PA 17745

An Equal Opportunity Employer M/F



Software Technical Writers

Here's your chance to get involved with today's leading producer of computer software. And move ahead with a company that's in a class by itself. Right now, one of our most prestigious clients is looking for software specialists with career aspirations to join them. As a Massachusetts data-base software firm, our client boasts a unique approach to computer software. Within their dynamic progressive environment, you'll find yourself in a position where you'll truly prosper and grow. If you're looking to make a really rewarding change, now's the time to contact Norton, Kleven. After 10 successful years, our staff of former industry professionals can give you the finest confidential consultation available.

Challenging software documentation positions are available for Technical Writers with two or more years experience as a Programmer/Analyst or as a Software Technical Writer. Specific assignments will be in the following areas:

DATABASE PRODUCTS - Prior experience as a COBOL or PL/I programmer. Exposure to a database system is preferred, but not required. Some knowledge of large IBM systems and JCL.

DATA DICTIONARY PRODUCTS - Familiarity with COBOL is a must; exposure to a commercial data dictionary and/or database systems is a definite plus. Requires ability to master the product on both a conceptual and technical level, and to functionally cross-reference components of multiple Data Processing and Manual Systems.

DATA COMMUNICATIONS SYSTEMS - Familiarity with COBOL, PL/I, or ASSEMBLER. Exposure to a commercial data communications and/or database systems is preferred. Requires some knowledge of IBM or similar systems, and an ability to master concepts of interactive programming tools/techniques and operating systems functions from a writing standpoint.

Candidates for all positions must be able to work closely with development teams and use their products to the extent necessary to write sample programs and/or generate examples. Duties of positions include preparation of User Training Materials for all software products.

So call, Norton, Kleven at (617) 861-1020, today and ask Simone Zani about these exciting opportunities to join the best in computer software.

NK Norton, Kleven and Co., Inc.
INDUSTRIAL RELATIONS MANAGEMENT CONSULTANTS

Three Fletcher Avenue, Lexington, Massachusetts 02173
Telephone (617) 861-1020

Member
Massachusetts Professional Placement Consultants
National Computer Associates, Office, Nationwide
Representing Equal Opportunity Employers M/F



WHEN YOU SEE WHAT WE OFFER A REGIONAL SALES MANAGER, WHAT YOU'RE MAKING NOW MAY SEEM LIKE SMALL POTATOES.

The vitality and growth of Data General is no secret any more. In eleven short years, we've hit the Fortune 500, and today we combine our solid position in the computer industry with a vast potential for future development.

One of our regions is now ripe for a top notch individual with 5 to 7 years in senior sales management.

Here's the offer:

1. a solid base salary. PLUS
2. a financial incentive based on revenue growth rate. PLUS
3. an over-ride percentage of sales dollars within the region. PLUS
4. high incentives throughout our regional sales force, with a policy of no reduction in commissions as sales reps meet and pass their goals. PLUS
5. a tempting stock option plan.

You probably are already a seasoned sales manager in the computer field and know how to plan, forecast and report sales. You know how to interface productively with a variety of customers, including Commercial End Users and with both the scientific and OEM communities.

This position is one of those rare "sky's the limit" situations with a dynamic fast-moving corporation. So leave those small potatoes behind. Aren't you ready for the big cabbage?

Please call Frank Keaney direct on Tuesday or Wednesday, December 11 and 12 at (617) 235-8171. He's our Director of North American Sales. Or send your background in strict confidence to him at Data General Corporation, 888 Worcester Road, Wellesley, MA 02181.

As a result of our expansion we're also looking for several seasoned District Managers across the country.

An equal opportunity employer M/F.



DP MARKETING

Fox-Morris Associates, nationally recognized as leaders in Data Processing placement, has current opp'tys with "Fortune 500" clients including:

Computer Systems	\$80,000
District Mgr - Phila	
Computer Graphics	\$40,000
Regional Mgrs. - Eastern U.S. & L.A.	
Sales Rep - Boston	\$40,000
Software	
Sales Rep - N.Y.	\$38,000
Peripherals	
Sales Rep - N.Y.	\$38,000
Remote Computing	
Sales Mgr - Florida & Michigan	\$35,000
Remote Computing	
Sales Rep - N.Y.	\$30,000
Clients	
Clients pay all employment costs. Contact in confidence. Don Owens (215) 561-6300. FOX-MORRIS ASSOCIATES, 1500 Chestnut, Phila., PA 19102.	

DECSYSTEM 20-LISP

Position available for a Programmer Analyst in a DECSYSTEM-20 research environment. Will work directly with faculty and other researchers in artificial intelligence. Will be responsible for maintenance and development of research tools and other support of research activities. Should be familiar with LISP or other single manipulation language.

Requires Bachelors degree or equivalent related work experience, as well as, a thorough knowledge of time-sharing systems.

Excellent fringe benefits.

Qualified candidates send resumes (Ref. #213) indicating salary requirements to:

Division of Personnel
RUTGERS UNIVERSITY
New Brunswick, N.J. 08903
Affirmative Action/
Equal Opportunity Employer

Systems Programmer

Harley-Davidson, a major manufacturer of quality recreational vehicles, has a responsible career position available within Data Processing. Open due to a promotion, this position is responsible for the development of customized software programs; maintenance and trouble shooting of existing software programs and problems; and for providing assistance in the development of application design specifications. Preferred qualification include 1 to 2 years of DOS/VS, ALC, and CICS experience. System/maintenance experience is a plus. This is truly an opportunity worth exploring. For immediate consideration forward a resume in confidence to Salaried Employment.

AMF/HARLEY-DAVIDSON
P.O. Box 653
Milwaukee, WI. 53201

An Equal Opportunity Employer M/F



position announcements

position announcements

position announcements

position announcements

position announcements

PROJECT MANAGER - NH

Internal. mfr. of computer peripherals seeks shirtsleeve, hands-on proj. mgr. to design & implement mfg. sys. IBM 370/148 OS/VS 1, COBOL bkgd. pref. Located in beautiful country setting. Salary \$25,000 range. (Fee Paid).

Contact Gerry Battista.

Robert Half of Boston Agency
100 Summer Street
Boston, MA 02110
(617) 423-1200

COMPUTER SCIENCE FACULTY

Faculty opening in Computer Science in Spring 1980 for individual to teach all levels of Data Processing courses, including COBOL and Assembly plus introductory level courses. Master's or Bachelor's Degree in appropriate discipline required plus multiple years of DP experience. 3 years of business or teaching experience. DOS or OS Job Control Language experience helpful. Salary commensurate with credentials and experience. Respond in writing by Dec. 15th to:

Marion County Community College, Personnel Services, Dept. DP, PO Box B, Trenton, NJ 08800

Equal Opportunity/Affirmative Action Employer

DIRECTOR OF DATA PROCESSING

Cochise College located in historic, beautiful southeastern Arizona is seeking a Director of Data Processing. A Bachelor's Degree in Business or Data Processing is required with a Masters preferred. Candidates should possess four-five years responsible experience including the supervision of a data processing unit. Current knowledge of Sperry-UNIVAC 9030 system would be helpful. Duties include supervision of data centers for administrative and academic applications; supervision of input, operating and programming functions; and organization and control of the college computer operation. Salary \$16,711 - \$20,148/yr. (dependent upon experience). Apply before December 14, 1979 Personnel Office, Cochise College, Douglas, AZ 85607.

Equal Opportunity Employer M/F

COMPUTER SERVICE SUPERVISOR

Excellent opportunity to join prestigious international firm in Midtown NYC. Must have minimum 4-5 yrs. experience in Applications Programming with emphasis on accounting functions and knowledge of FORTRAN, BASIC, and COBOL Languages. Strong administrative skills required. Please submit resume including full salary history to:

Jane DiAnthony
40th Floor
153 East 53rd St.
New York, N.Y. 10022

An equal opportunity employer M/F.

NATIONAL OPPORTUNITIES**for**

MID/SENIOR LEVEL TECHNICAL CONTRIBUTORS AND PROJECT LEADERS
interested in career advancement.

Applications/Systems Software/Software Development
in Mini/Micro and Large-Scale Technologies

CONTACT MICHAEL O'KEEFE or DANIEL BARROS
CALL COLLECT (617) 273-1740
or submit resume.

Available Monday and Wednesday until 8 P.M. (EST)

Management Advisory Services Inc.

"The Recruiting Firm for the Computer Professional"
16 New England Executive Park, Suite 3500, Burlington, MA 01803

Clients assume all fees and relocation expenses.

Executive search and placement consultants, representing equal opportunity employers.

**MINI/MICRO PROFESSIONALS**

If you're seeking to expand your professional horizons and your expertise is in the mini-computer/microprocessor field then we need to talk to one another. The growth in this area is driving demand for your skills, be it with OEM's or users, to unprecedented levels.

Our clients, with locations in virtually every state in the U.S.A., need programming, software, hardware/software and engineering personnel to satisfy this demand for your expertise which is at an all time high. OEM applications include systems architecture development, systems performance requirements and space development, hardware/software design and performance, data base design, diagnostics, compiler design, systems integration of new software releases, design trade off evaluations, etc. User real-time environments include process control, engineering, communications, military, graphics, simulation, modeling, software development, etc. in various hardware environments (DEC, Data General, Interdata, Hewlett-Packard, Honeywell, IBM, Varian, Datapoint, Wang, Four-Phase, Prime, Intel, Motorola, etc.). Salaries range from \$10,000-\$40,000.

To explore these dynamic opportunities please send your resume (including salary history and geographic preferences) in complete confidence or call Ky McCarthy.

SPECIALISTS IN COMPUTER PERSONNEL PLACEMENT

ComPros
A Division of Wetterns & Agnew, Inc.

1200 Midtown Tower, Rochester, N.Y. 14604 • 716-454-4790

position announcements

position announcements

position announcements

position announcements

position announcements

DTSS

SYSTEMS SOFTWARE PROFESSIONALS . . .

DTSS Incorporated has a continuing need for truly excellent programmer/analysts and project leaders in our systems software group.

DTSS Incorporated participated in the joint development of the Dartmouth Time Sharing System with Dartmouth College. The company is now a subsidiary of Metropolitan Life Insurance Company, licensing software and providing services to industrial organizations, government agencies, academic institutions, and computer service companies worldwide.

Current projects being advanced by our technical staff include a relational data base manager, a high speed communications processor, extensions to programming languages, and operating system development.

DTSS Incorporated

10 Allen Street
Hanover, NH 03755

An equal opportunity employer.

COMPUTER SYSTEMS MANAGER/ANALYSTS/PROGRAMMERS

The Commodity Futures Trading Commission has openings for computer professionals grades GS-7 through GS-14 in Chicago, Illinois.

Salary Range \$13,925 to \$45,126

Grade and salary dependent on qualifications

New manager and software development/maintenance team for regulatory processing of futures trading data. Demonstrated ability in Cobol in batch mode required. Ability or knowledge of NCR Century System and/or futures trading process desirable.

Apply to:

Commodity Futures Trading Commission

Office of Personnel
2033 K Street, N.W.
Washington, DC 20581
ATTN: Richard Young

Equal Employment Opportunity Employer

Data Processing

EDP SECURITY SPECIALIST

Virginia Based Bank Holding Company seeks highly motivated individual to design and establish procedures and controls to insure integrity and security in the development of a new MIS system. Individual will report directly to the General Auditor and provide senior management with alternatives in maximizing data security.

Candidate must have excellent written and oral communications skills. A Computer Science Degree is preferred along with a thorough knowledge of the security aspects in: Communication Software/Hardware Operating Systems, Data Management Systems, and Computer performance.

Current environment includes IBM 3031 DOS/VS POWER.

Excellent salary and employer paid benefits package. Submit resume with salary requirements to address given below. All inquiries will be handled in strict confidence.

FIRST VIRGINIA BANKS, INC.
6400 Arlington Boulevard
Falls Church, Virginia 22042

An Equal Opportunity Employer M/F

PARADYNE & FLORIDA A Beautiful Combination!!!

Paradyne Corporation, located in beautiful Largo, Florida is continuing dramatic advancements in the Data Communications industry through successful engineering and design innovations. To further promote this exciting product development, we offer numerous professional opportunities at various levels of experience and education.

HARDWARE DESIGNERS

Position requires strong experience in Digital Design (TTL) with emphasis on Processors and Controllers. Signal processing experience desirable but not required. Degree required.

SOFTWARE DESIGNERS

Several positions available ranging broadly in experience and education. Successful backgrounds on all aspects of design and development, such as: Operating Systems Internals, Mini-Computers, Communications, Real-Time Application and Translator Writing/Compiler Internals will qualify. Average 3-7 years experience with degree in Computer Science or related required.

TECH WRITERS

(Hardware or Software)

Strong written skills required to develop User hardware/software manuals; IBM 360/370 and/or assembly language helpful.

As a respected member of our dynamic growth picture, you will receive a salary commensurate with experience, a full benefits package and unlimited growth potential. Please forward your resume, outlining work history and salary requirements, in confidence to:

Steven G. Hoskins
Professional Recruiter

paradyne

Paradyne Corporation
8550 Ulmerton Road
Largo, Florida 33541
An Equal Opportunity Employer M/F

DALLAS

System Migration Pros

Our clients are doing DOS/VSE and OS/MVS in 1980. Excellent opportunities to take charge of systems software area and manage these upgrades. Salaries \$25-30K.

Suite 1109, Stemmons Tower W
Dallas, TX 75207, (214) 637-6360

**DATA PROCESSING
CAREERS** inc

FT. WORTH

Software Manager

Lead major software migration effort to IBM 3031, IMS, MVS. Will be initiating new software development, new software generation, TP and Data Center support. New position. Salary to upper \$30's.

Suite 911, One Summit Ave
Fort Worth, TX 76102 (817) 336-4565

**DATA PROCESSING
CAREERS** inc

TULSA

OS/COBOL APPLICATIONS
FOR ENERGY COMPANIES
TO \$28,000

A recent study in "Futurist" magazine rated Tulsa as the least economically distressed city in the country with a population exceeding 250,000.

2624 E. 21st St., Tulsa, OK 74114
(918) 747-3621

**DATA PROCESSING
CAREERS** inc

KANSAS CITY

We represent the finest clients in Kansas City and throughout the Midwest. Outstanding opportunities for Programmer/Analysts and Software Programmers with OS/COBOL, BAL, MVS, CICS or IMS experience. Salary range \$18K - \$28K.

6405 Metcalf Shawnee Mission,
Kansas 66202 (913) 236-8288
**DATA PROCESSING
CAREERS** inc

MIDWEST REGIONAL COMPUTER LEASING SALES MANAGER

Randolph Computer Company, division of The Bank of Boston, seeks a qualified candidate with a strong knowledge of lease financing and IBM computers to sell IBM 370, 303M, 4300's and peripherals on a wide variety of lease plans.

Experience in developing contracts designed to meet customers' requirements will be helpful.

If you have had a successful sales background in computer lease sales, and are excited with the idea of assuming a responsible position with a progressive, stable company that has a successful 15-year track record in the industry, call Randolph Computer Company today. Phone: (203) 661-4206.

RANDOLPH COMPUTER COMPANY

537 Steamboat Road
Greenwich, CT 06830

PROGRAMMERS/ANALYSTS, OUR GROWTH IS ON YOUR SIDE.

We're Arbitron, a leader in radio and TV audience measurement and analysis. Expanding activities have created opportunities for programmers/analysts with experience in COBOL and/or FORTRAN. CDC Cyber NOS experience a definite plus, but not mandatory.

Salaries are competitive. Benefits excellent. We are located in beautiful suburban Maryland near Washington. A nice place to work and live. Don't let this chance pass you by. Send your resume, in confidence, to Carol Poske.

THE ARBITRON COMPANY

GD a research service of
CONTROL DATA CORPORATION
4320 Ammendale Road
Bethesda, Maryland 20705
An Equal Opportunity
Affirmative Action Employer M/F



position announcements

position announcements

position announcements

position announcements

position announcements

DALLAS

Information Services
Project Leaders

Billion dollar electric utility corporation with centralized DP operation has wide range of new information services systems including construction project management, materials management and financial systems.

We are currently seeking experienced project leaders for these new systems with background in the following areas:

- Strong Design and Analysis Background
- Direct Project Management Experience
- Experience in development of Data Base System

The selected candidates will manage project teams of two to twenty people. This is an excellent opportunity to join a growing state-of-the-art organization.

Send resume and salary history to Employee Relations Department, Management Recruiting Division. No agencies please.



Central and South West Services, Inc.

2700 One Main Place • Dallas, Texas 75250

An equal opportunity employer

SYSTEMS ANALYSTS

Touro Infirmary, a 570-bed teaching hospital located in the beautiful Garden District of New Orleans, is currently seeking two Systems Analysts for our Computer Science Department. We have an IBM 370/138 Computer.

We would like individuals with one or more years experience using the following computer resources:

- DOS/VIS
- CICS/VS with Command Language
- Assembler (a plus)
- COBOL
- VSAM
- DL/1
- Data Dictionary
- DB/DC Concepts

Salary is commensurate with experience; we have an excellent benefit package including tuition reimbursement, discounts on all hospital services and paid relocation. Please send resume to or call collect Jill Ireland, Employment Manager, 1401 Foucher St., New Orleans, Louisiana 70115 (504) 897-8408.

PROGRAMMING
OPPORTUNITIES

You'll enjoy working for one of New Jersey's leading banks in one of these immediate opportunities. The atmosphere is professional but friendly, the size is small but productive and opportunities for personal and technical advancement are unlimited.

PROGRAMMER ANALYST

Enthusiastic individual with 3-5 years' job related experience. Previous COBOL background required. Good communication skills a plus.

PROGRAMMER

1½ to 2 years' experience in COBOL programming for our dual vendor shop with a Burroughs B3700 and a brand new IBM 370/138 that will utilize OS/VS1, CPCS, CICS, a Data Base System and On-Line programmer testing.

We offer attractive salaries and excellent paid benefits. If you qualify for either of the above openings, please send your resume with salary requirements to: Cecilia McVey, Employment Representative.



CORPORATE
HEADQUARTERS
630 Franklin Blvd.
Somerset, N.J. 08873

Equal Opportunity Employer M/F

WORD PROCESSING SOFTWARE/HARDWARE DESIGNERS

You'll find both design freedom
and powerful resources at
NCR/Columbia

NCR's Engineering and Manufacturing facility in Columbia, SC will be responsible for NCR's new entry into office Automation Systems. We're staffing this undertaking right now.

As the organization that specializes in the development and manufacture of communications systems, microprocessor-based controllers, and coordinates terminal communications interfaces and disciplines for all NCR divisions' products, we have the resources you'll need.

You'll also have the commitment of the world's second largest computer company behind you.

If you are qualified for one of the following opportunities, get in touch with us promptly.

Word Processing
System Software

Requires experience in OS and real-time I/O familiarity with Assembly, high level language coding/file management techniques and data structures. Openings exist in Systems Executive/control software, system utility, diagnostics, I/O driver development, firmware, and start up.

Text Editor
Programmers

Background should include experience in designing and documenting complex software modules including the design and implementation of text editors. You will be responsible for product planning, architectural definition, and test specifications for various W.P. products.

Announcing
a new NCR
word processing
development
groupPROJECT LEADER
Word Processing
Applications Software

Requires experience in word processing systems with detailed knowledge of data structures and techniques for text editing. Prior background in management and implementation of complex software systems is needed. You will be responsible for the applications software group in the development of software modules, word processing text editor, and architectural definition of word processing products.

Columbia, the state capitol, with a population of 350,000, is one of the sunbelt's most attractive cities, home of the University of South Carolina. We're within reach of the seashore and the Great Smoky Mountains. Taxes are low, housing is affordable.

If you're currently working in a Word Processing environment, or would like to explore these growth opportunities, send your resume to Ken Uhlig, Word Processing Department T50, NCR Corporation, 3325 Platt Springs Road, West Columbia, South Carolina 29169.



Complete Computer Systems

An Equal Opportunity Employer

ANALYST/PROGRAMMER

A large communication company is looking for personnel with experience in communication programming, photo composition, or Hewlett Packard 3000 Systems. Send resume to:

Director of Information Services
Media General, Inc.
301 E. Grace Street
Richmond, VA 23219

PROJECT MANAGER \$32,000

Work closely with top management at this major wholesale grocery distributor. Strong system experience with POS and ON-LINE point-of-sale programming in background helpful. Manage the design and implementation of a store level scanning system. Position reports to president. \$32,000

NEVER A FEE
TO OUR APPLICANTS

Call: MARTY AMATO

Confidential

ROBERT HALF

OF NEW YORK, INC. Agency

522 Fifth Avenue

New York, NY 10036

(212) 221-6500

position announcements

position announcements

position announcements

position announcements

position announcements

Bankers Data Processing, a Boston based firm, specializing in on-line real-time systems operating on large scale Burroughs hardware (B6700's), seeks professionals for various positions in its Systems Support Department:

ASSISTANT DATA BASE ADMINISTRATOR

Responsible for preparing and maintaining DMSII data base descriptions, assisting in analysis of data base usage and performance, providing operational data base problem support. Candidate must have DMSII, DASDL, and a working understanding of Burroughs large systems hardware, software and systems concepts.

SYSTEMS SOFTWARE TECHNICIAN

Responsible for providing support in the following areas: operations problem support, programming problem support, performance analysis (statistics gathering and evaluation), system software troubleshooting, overall machine utilization analysis, some program and procedure maintenance, etc. Candidate must have experience in one or more of the above areas. Experience must be on Burroughs large systems. College degree or equivalent.

Salary for each position is commensurate with candidate's qualifications. Send resume and salary requirements in confidence to: BANKERS DATA PROCESSING, INC., c/o Provident Institution For Savings, P.O. Box 1791, Boston, MA 02105. Indicate position desired; or call: (617) 423-9600, Ext. 156.

bdp • • • leader in on-line • •

An Equal Opportunity Employer M/F

PROGRAMMER/ANALYST

Exciting opportunity for aggressive individual to join a rapidly growing leader in interactive database systems development. Add your skills to a creative technical staff developing and enhancing turnkey systems on the cutting — edge of technology. Participate in the growth of a company now marketing on an international scale. Limited travel. Excellent salary and benefits supporting professional and career development. Minimum of one years experience in mini-computer programming and/or database logic required.

Please call or write in confidence to:

Mr. Terry Pierce
Assoc. Director, Systems Development
DataPhase Systems, Inc.,
3770 Broadway, Kansas City, Mo. 64111
816/931-7927 EOE/M-F



Anyone can find jobs in data processing. But, the really good positions are hard-to-find.

Robert Half offices have specialized in finding the best edp positions for more than 30 years...since it all began. We have 70 conveniently located Robert Half offices in the United States, Canada and Great Britain. Look us up in the White Pages.

ROBERT HALF
data processing and financial personnel specialists

Copyright 1979 Robert Half

Telecommunications

A New Climate Of Challenge

The high visibility world of Wang offers up-to-the-minute involvement in your area of expertise...the chance to define new levels of computer sophistication...wherever your personal and professional aspirations may direct you. Wang provides the climate of challenges your career demands.

If you're a design oriented software development specialist who is not only comfortable with ongoing telecommunications standards such as 3270, HASP, x 25, and SDLC SNA but is also capable of addressing the long range projects of the future in protocol and networking development, take up the challenge of Wang Telecommunications.

Systems Programmers Associate to Senior Level

Systems Programmers are needed to design, develop and maintain telecommunications systems for our VS system. Opportunities now exist at a variety of levels.

Applicants should have a BS degree in a computer related discipline or equivalent. Experience: 2-4 years experience in general and/or real time software development. 4-8 years for Senior Systems Programmers. Experience in minicomputer and telecommunications is highly desirable.

We offer excellent salary and benefits including profit sharing, stock purchase plan, stock bonus plan, medical and dental insurance. Please send resume including salary history to Susan T. Morse, Professional Recruiting, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

We are an equal opportunity employer

WANG

Making the world more productive.

PROGRAMMER/ANALYST(S)

The University of Delaware is seeking candidates for openings in the following areas of administrative data processing:

SENIOR PROGRAMMER/ANALYST(S)

— responsible for the design, programming and implementation of information systems in higher education. Minimum qualifications require the equivalent of a bachelor's degree with 3 to 4 years effective experience.

PROGRAMMER/ANALYST(S)

— responsible for the design, coding, and testing of administrative programs including system testing, user training, and the preparation of final documentation. Minimum qualifications require the equivalent of a bachelor's degree with 1 to 2 years effective experience.

These positions offer an opportunity to work within a centralized multi-computer university computing center supporting a state-wide computer resource sharing network to all Delaware public colleges and universities. Experience with Burroughs data base techniques on large scale Burroughs B-7700 computer systems is desirable.

Send resume including salary requirements by December 14, 1979 to:

Daniel J. Heimrich
Assistant Director - Computing Center
Administrative Systems
192 S. Chapin St.
University of Delaware
Newark, Delaware 19711

An Equal Opportunity/Affirmative Action Employer

N.Y. AREA CONSULTING TO

\$1000/Week
FULL TIME TO
\$40,000

IMS, BAL, Cobol CT, NYC
Cobol, CICS NJ, NYC
BAL, COBOL NJ, NYC
Cobol, OS NJ, NYC
Mark IV NJ, NYC
Datapoint NJ, NYC
RPG NJ, NYC
PDP/11, Unix-C NJ
PDP/11, Fnn, Basic NYC

Call or forward resume

THE CONTRACTORS EXCHANGE LTD.

1140 Avenue of the Americas
New York, N.Y. 10036
(212) 840-8193

Business Software Marketing Development Analyst - HRMS

Wang is a success story in growth. And if you're a seasoned marketing professional, you can write your own chapter on growing with Wang in this incredible position being offered now.

In this top flight marketing position, you will be regularly interfacing with the Director-Vice President level within the highly visible Market Planning and Development Group. This group is responsible for all new product planning for Wang, the industry leader in product rich offerings.

You should be knowledgeable in general business software, particularly HRMS products, to plan and manage our product mix in this area. Systems include the exciting new Wang VS computer system, the OIS state-of-the-art office products family and the industry leading Integrated Information Systems which Wang recently announced.

Applicants should have at least 5 years experience in the data processing industry, knowledge of the application area and college degree. Use your communication skills and ambition to convince us that you're right for the job.

We offer excellent salary and benefits including profit sharing, stock purchase plan, stock bonus plan, medical and dental insurance. Please send resume with salary history to Mark Camp, Employment Supervisor, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

We are an affirmative action employer

WANG

Making the world more productive.

position announcements

position announcements

position announcements

position announcements

position announcements

DATA PROCESSING PROFESSIONALS

General Telephone of the Northwest, Inc. continues to grow creating exceptional opportunities for talented professionals in the following areas:

PROGRAMMER ANALYST

Work in project development and implementation environment utilizing DEC and HP equipment. Requires heavy business programming background and experience scoping and specifying systems. Must have excellent managerial and communications skills. Salary to \$25,000.

SYSTEMS ANALYST

Responsible for project feasibility analysis definition and design, development, coordination and implementation. Requires heavy business programming background and strong leadership skills. Must have excellent managerial and communication skills. Salary to \$26,000.

D.P. PLANNERS

Responsible for development and maintenance of business system plans including information flow analysis and user group requirements definition. Requires systems analyst experience and familiarity with systems planning and data base concepts. Must have ability to work with people and excellent oral and written communications skills. Salary range to \$26,000.

DATA MANAGEMENT ANALYST

Work in a planning environment interfacing with users and systems development groups to define and manage data and data structures. Requires good understanding of data storage and access methods, ability to work with people and an understanding of the use of a data dictionary to manage data resources. Must have excellent managerial and communications skills. Salary range to \$25,000.

At GTE, our people are one of our most important resources. We offer competitive salaries with an excellent benefits package. Enjoy the progressive spirit and challenging environment where personal and professional growth is unlimited. Make your move today, send a resume with salary history to:

General Telephone of the Northwest, Inc.

Personnel Department
1800 - 41st Street
Everett, Washington 98201

GTE

An Equal Opportunity Employer

DATA PROCESSING PROFESSIONALS CAREER OPPORTUNITIES IN A STATE-OF-THE-ART ENVIRONMENT

The Ralph M. Parsons Company, one of the world's largest and most successful engineering/construction companies, has immediate openings at our world headquarters in Pasadena, California for the following positions.

Senior Systems Analyst

Bachelor's degree and 6 years analysis experience. Must have strong COBOL background and supervisory experience.

Group Supervisor

Bachelor's degree and 3 years experience supervising a computer processing section. Experience on large scale IBM 370/158 using OS/MV required.

Programmer/Analyst

Bachelor's degree and 3 years experience in programming and systems analysis. Knowledge of COBOL and FORTRAN is helpful.

Engineering Programmer

Bachelor's degree in Engineering and 2 years experience in solving engineering problems. FORTRAN and IBM 370 experience are required.

(For the above classifications contact ALEX BARNA at (213) 440-2829)

If a phone call is inconvenient, please send a resume, including salary history to:

Professional Staffing
100 West Walnut Street
Pasadena, California 91124

PARSONS
Pride in Performance

An Equal Opportunity Employer Male/Female

DATA BASE ANALYSTS

Aramco needs you now to create new data bases for our ever-growing computer network.

Aramco is the world's largest oil-producing company and the key firm involved in the development of Saudi Arabia's energy resources.

Our projects are staggering in scope, complexity and imagination. They cover exploration, production, refining, materials supply, engineering, finance, personnel and much, much more. It takes an enormous, ever-enlarging computer network to control all these activities. That's why we're looking for good Data Base Analysts right now.

The challenge

You'll be generating data base descriptions and program specification blocks to meet the application group requirements—plus creating new data bases with new items, or fitting new application requirements into existing data items.

You should be good at organization. We'll want you to recommend a storage plan for data, determine access, allocate and record data sets, establish rules for data segment updating, select

pointers to be used.

That's not all. You'll do work on abnormal terminations in the data base/data communications system. And you'll be handling batch message program problems and message-processing problems.

Excellent combination of benefits offered

As a Data Base Analyst with Aramco, you can earn a competitive salary, plus a cost-of-living differential. In addition, you get a tax-protected premium for overseas employment which can amount to as much as 40 percent of your base salary.

Beyond that, Aramco offers you a comprehensive benefits package which includes 40 days' paid vacation every 12½ months (this gives you the opportunity to travel in Europe, Asia, Africa)—plus housing for singles and families, and American school systems for your children.

Interested? Call us now. Toll-free: 1-800-231-7577, ext. 4062. In Texas, call collect: (713) 651-4062. Or send your résumé in confidence to: Aramco Services Company, Department CWI121079JWCC, 1100 Milam Building, Houston, Texas 77002.

CHALLENGE BY CHOICE

ARAMCO

SERVICES COMPANY

Ariz./Calif./Texas BUSINESS/SCIENTIFIC

All Fees Paid \$12-\$30,000

Prog/Anal/Systems
DB/DB2/DB/DB2
BAL/COBOL/ASSEMBL/FORTRAN

OS/DOS/IMS/MVS/JES II

'One to One' Service. Many openings in Ariz. & Calif. Your name & present employer will not be given out without your permission.

If you want to talk about your future, send us a confidential resume at no obligation. We won't waste your time.

Dan Pullman - (602) 274-5880

PULLMAN PERSONNEL
3003 N. Central, Suite 1706
Phoenix, AZ 85012

Ariz./Calif./Texas SCIENTIFIC PROGRAMMERS

All Fees Paid \$15-\$25,000

If you have a BSEE, BSCS, BS in Physics or equivalent, we have many openings in Arizona, California & Colorado.

Your name, resume & present employer will not be given out without your permission.

For sincere personal service, please send a confidential resume to:

Dan Pullman - (602) 274-5880

PULLMAN PERSONNEL
3003 N. Central, Suite 1706
Phoenix, AZ 85012

CHARGE INTO THE 80's

NOW is the dawn of a new decade and a new era of dynamic growth in Data Processing. The EDP specialists at Dynamic Personnel System are ready to meet the challenge of these changing times with new openings at every level, including:

PROJECT LEADERS SYSTEMS ANALYSTS PROGRAMMER ANALYSTS

to 30K
to 28K
to 25K

Openings are available throughout New England and nationwide through our affiliation with National Personnel Consultants.

Naturally, companies pay all fees, interview and relocation expenses.

Send resume or call (collect) A.J. Rachele at (413) 781-0982.

npc

dps

PACIESTS

DYNAMIC PERSONNEL SYSTEM

181 Park Avenue

West Springfield, MA 01089

position announcements

position announcements

position announcements

position announcements

position announcements

INSIDE FAIRCHILD

CLOSE-UP: Integrator Product Specialist

Fairchild Test Systems Group has immediate opportunities for Product Sales Specialists for our revolutionary new integrator. Openings are available in key cities throughout the United States. You will work in conjunction with account executives to sell Fairchild integrated products to semiconductor manufacturers and users. This challenging and stimulating position includes a base salary plus incentive and company car, along with the many fine benefits provided by Fairchild.

The successful candidate will have a minimum of 1-2 years' experience in HP RTE-IV. Degree and semiconductor experience desired.

For immediate consideration, call Bob Elliott collect at (408) 998-0123 or send your resume to him at Fairchild Test Systems Group, 1725 Technology Drive, San Jose CA 95110.

At Fairchild, we're proud of our efforts as an affirmative action employer and we encourage women, members of minority groups and the handicapped to apply.

Openings in key cities throughout the United States.

FAIRCHILD

We started it all.

BAYLOR UNIVERSITY FACULTY POSITION

Tenure track position in Computer Science beginning Fall, 1980. Training in operating systems or data base management systems preferred. Will consider other areas. We want a Ph.D. who will help build a quality undergraduate computer science major. Must excel at teaching. Baylor is a private university affiliated with the Baptist denomination. Send resume to:

Howard Roff, Baylor University
Waco, Texas 76703

Position Offered

Sacramento, California based bank automation servicer for California banks with growth opportunities, is seeking

System Programmers

Must be familiar with Burroughs assembler language. Minicomputer and on-line experience beneficial but not required. Send resume to:

Xerox Computer
Systems, Inc.
1775 Tribune Road
Sacramento, CA 95815

A NATIONWIDE CAREER SERVICE FOR COMPUTER PROFESSIONALS

Programmer analysts, project leaders, systems programmers, IBM, Honeywell and minis. Salaries to \$40,000.

No fees or contracts. Our client companies pay all expenses. Career consultation prior to any action. Over 1000 EDP positions represented nationwide.

Send your current resume (or an old one with pencil update) together with salary history and geographic preference in complete confidence to our suburban Philadelphia headquarters . . . or phone:

Systems Personnel, Inc.
Suite D-20
P.O. Box 14
Haverford, PA 19041
215-565-2920

Systems Personnel
INC.
MEMBER OF NATIONAL COMPUTER ASSOCIATES

WE'RE INVESTING \$35,000,000 IN US AND YOU.

Harris Government Systems Group
Operations designs, develops and manufactures high technology electronic equipment for a broad spectrum of industrial and government markets.

And, we're pleased to say, business is good!

In fact, the Harris Corporation will be investing over \$35,000,000 in capital expansion in Melbourne, Florida, this year.

For our part, current expansion has created the following career opportunities:

PROGRAMMERS/ SENIOR PROGRAMMERS

Qualified individuals will have experience in business applications programming (Personnel, Payroll, Finance, Accounting, or Materiel Systems), and familiarity with large IBM Hardware and JCL, and OS/MVT and MVS/ES3 operating systems. Good communications and technical documentation skills a plus. BS Computer Sciences or related degree.

PROGRAMMER ANALYST

Qualified individuals will possess the same

skills listed above, but with 2 to 3 additional years experience in user contact and general system specification development.

MIS STANDARDS/ TRAINING ANALYST

Qualified individuals will have 3 to 5 years COBOL programming experience in IBM or equivalent facilities; with 2 to 3 years additional experience in developing standards and organizing training program. Must have highly developed communications, presentation, and interpersonal skills. BS Computer Sciences or related degree.

DEPARTMENT PLANNER

Qualified individuals will have 5 years experience in developing and monitoring \$2,000,000 plus department budget—Monitoring hardware leases and maintenance contracts; Preparing capital equipment plans and issuing purchase/lease authorizations; Monitoring an automated system distributing at least \$1,000,000 of computer charges to customers annually. BA in Business or related degree.

Please send resume with salary history and requirements to: R. B. Jones, Jr., Manager, Professional Staffing, Harris Government Systems Group, P.O. Box 37 CW, Melbourne, Florida 32901.

HARRIS IN FLORIDA, THE GOOD LIFE.



An Equal Opportunity Employer M/F

DIRECTOR OF M.I.S.

We are a major retailer, listed on the New York Stock Exchange, with more than 200 stores generating over \$200 million in sales. We are in the process of designing major new on-line systems to run on our 370/145 under DOS/VS.

We need an experienced EDP executive to direct the department. Requirements include:

- Technical management experience in EDP with line responsibility.
- Substantial experience with medium-scale IBM systems under DOS/VS using BAL, PL/I, and telecommunications.
- Specific experience in soft goods retailing.
- Specific experience with accounting and financial systems.
- Ability to work closely with senior management and consultants.

The ideal candidate will have the above credentials and will have progressed through the ranks over a period of 8-12 years to the position of Director or Assistant Director in a medium-scale IBM shop.

Please send resume with complete salary history to:
Personnel Director
The Miller-Wohl Co., Inc.
915 Secaucus Road
Secaucus, N.J. 07094



CALIFORNIA

If you are interested in relocating to CALIFORNIA, call the West Coast's largest firm devoted exclusively to employment services for the Computer Professional. Our staff is composed of former DP Managers and Software Specialists, well equipped to understand your special needs.

You may call us collect.

**MINI SYSTEMS
PROGRAMMER to \$29,5K**
Learn PASCAL and help develop O/S for "Office of the Future" system. Requires BS or MS in Computer Science and minicomputer systems experience. Ask for Software Division.

**SENIOR PROGRAMMER/ANALYST
to \$31K**
Start-to-finish development of Manufacturing and Costing Systems. San Fernando Valley location. Heavy user contact. Large IBM, IMS, DB/DC COBOL environment. COBOL and IMS background required. Ask for Large Systems.

PROGRAMMER to \$21K
Participate in the development of an on-line order entry system that is part of a distributed network. Requires two years COBOL on any computer. Ask for Business Systems.

**COMPUTER
CAREERS
INC. AGENCY**
280 Atlantic Avenue
Long Beach, CA 90802
(213) 437-2681

The University of Michigan-Flint Computer Science Department

Applications are invited for tenure-track and visiting positions of Assistant or Associate Professor. Applicants should have a PhD degree in Computer Science, Electrical Engineering, or a related discipline. All applicants will be considered regardless of their area of specialization but preference will be given to those who specialized in software engineering, operating systems, systems programming, database management, computer architecture, computer design, mini-micro computer systems. Professional development is encouraged and expected but emphasis is on quality of teaching. One of three campuses of The University of Michigan, located on a new riverfront campus in downtown Flint. The University of Michigan-Flint offers degrees to over 4,000 undergraduate students and an increasing array of graduate and graduate/professional programs. The Computer Science Department has a Burroughs B1825 system, a logic lab and a micro computer lab. There are excellent facilities for accessing the Ann Arbor AMDAHL 470 system with access to TeleNet. The Department currently offers the BS degree in Computer Science with plans for a graduate program in Software Engineering. Interested applicants should send a curriculum vitae and the names of three referees to:

Professor Nancy Martin, Chair
Department of Computer Science
The University of Michigan-Flint
Flint, Michigan, 48503

The University of Michigan-Flint is a non-discriminatory, affirmative action employer.

position announcements

position announcements

position announcements

position announcements

position announcements



PROGRAMMER ANALYSTS SYSTEMS ANALYSTS

Immediate Data Processing openings in sunny Southern Florida at one of the nation's fastest growing electric utility companies.

OUR COMPANY

Florida Power & Light Company is the 10th largest utility company in the country with over \$4 billion in assets. FPL serves over half of the State of Florida with corporate headquarters located in Miami.

OUR DATA PROCESSING ENVIRONMENT

A strong and dynamic technical environment for developing and supporting batch, on-line and data base management applications awaits you in the areas of:

- Financial & Accounting Systems
- Inventory Management Systems
- Construction Applications Systems
- Engineering Applications Systems
- Operations Research

Our technical environment uses state-of-the-art integrated information systems with a 7-Megabyte IBM 370-168 AP supporting: MVS; VTAM with SNA; IMS DB/DC; CICS; TSO.

Primary programming languages being used in systems development are COBOL, ASSEMBLER and FORTRAN IV.

Openings exist for dynamic experienced individuals interested in personal and professional growth in a leading-edge technological environment.

We offer an excellent benefit package, advancement opportunity and salaries commensurate with candidates' qualifications and experience.

Please send your resume, including salary history, in confidence to:

Mr. A. M. Strickland
Florida Power & Light Company
P. O. Box 529100
Miami, Florida 33152

AN EQUAL OPPORTUNITY EMPLOYER M/F

DOS/VSE SYSTEMS PROGRAMMER

Minimum of 3 yrs. experience in CICS/VS, VSAM, VTAM; knowledge of RPGII helpful; growing Los Angeles Company converting from System 3 to 4341.

Please submit resume including salary history in confidence to:

CW Box #2128
797 Washington St. Newton, MA. 02160
Equal Opportunity Employer. M/F

When your clients read like a Who's-Who of top American corporations



you can
afford to be
choosy.

Consult with the professionals

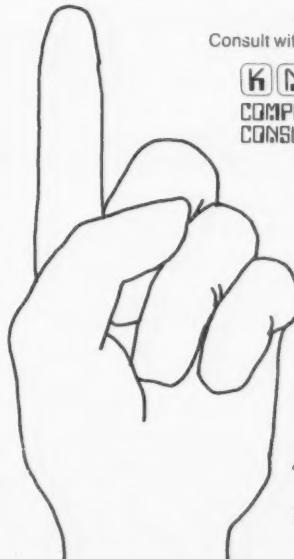
KNAUER
COMPUTER
CONSULTING INC.

Computer consulting. One of the most challenging and highest paying fields in data processing today. A career with full benefits and management opportunities.

KNAUER, a respected name in computer consulting, is opening offices throughout the west in SAN FRANCISCO, PHOENIX, PORLAND, and SAN DIEGO.

If you are a professional Programmer or Analyst with experience in IBM mainframes, skills in OS/DOS, COBOL, PL1, IMS or CICS, we want to see your resume! Or, better yet, give us a call at (415) 434-4200.

KNAUER



44 Montgomery St.
Suite 1360
San Francisco, Ca.
94104

Programmer/ Analysts

\$18 to \$28K
San Francisco
Bay Area

Several of our Bay Area clients have immediate openings for IBM Programmer/Analysts with a minimum of one year COBOL experience. Manufacturing, Finance or Distribution experience is desired. Positions offer excellent benefit packages.

We are consultants to management. Please call or send resumes in confidence to: Craig Bucy, One Maritime Plaza-Suite 1350, San Francisco, California 94111. (415) 956-7120. Employer assumes fee.

**professionals
for computing, Inc.**

DATA PROCESSING MANAGER

Prestige medium sized manufacturing facility requires professional D. P. Manager possessing knowledge of common data system and RPGII language. Candidate will be one who can successfully manage through written and verbal communications at all levels.

Possibly now the number 2 man ready to progress into a Manager's position. Specific experience must include material requirements planning, capacity planning, and manpower scheduling.

We offer an excellent fringe benefit package, growth potential and a salary commensurate with experience. Interested individuals should call A.S. Priola at (317) 632-8411 Ext. 416 for an interview appointment.

South Wind
STEWART-WARNER **SW**

An Equal Opportunity Employer M/F

position announcements position announcements position announcements position announcements position announcements

SYSTEMS ENGINEERS

Leadership Careers Where You Make The Difference.

Storage Technology Corporation is only ten years old and already the world's largest manufacturer of high density tape storage products and a major manufacturer of disk subsystems. We've built our reputation on innovation and advanced technology because we encourage the independent, creative contribution of every one of our people. Last year we went over 300 million in revenues, up from 162 million just a year earlier, so we know our philosophy works.

If you are a self-motivator looking for a new challenge, STC offers the opportunity for contribution and individual development not often found with a major corporation. SYSTEMS ENGINEERS with STC consult and provide technical support to field sales and marketing. You set your own schedules and prepare your own presentations. And, we may have a good spot for you right where you are now. Requirements include:

- The ability to write and present technical materials clearly and effectively.
- Knowledge of the internals of one or more IBM virtual operating systems (MVS, SVS, VSI, VM, DOS/VSE).
- College Degree (or equivalent experience).
- Knowledge of any of the programming languages (FORTRAN, COBOL, PL/1), and a high level of proficiency in ALC desirable.

We are building a top-notch technical marketing support team to compliment our unequalled products, performance, and service. If you have the above credentials, we have an exceptional career for you at STC.

OPENINGS IN BOSTON, HOUSTON, CHICAGO, DETROIT & NEW YORK.

For fastest consideration with absolute confidentiality, send your resume to Mr. Chuck O'Bryan, Dept. CW12/10-12/24, MD#13, or give Chuck a call TOLL FREE 800-525-2940, Ext. 3027, or Fred Moore at Ext. 3008 for additional information. We have a lot to say that you'd like to hear.

STORAGE TECHNOLOGY CORPORATION

2270 South 88th Street
Louisville, Colorado 80027

We Are An Equal Opportunity Employer M/F



Data Processing

FINANCIAL APPLICATIONS PROGRAMMER

Our accounting department has an unusual opportunity for a Data Processing professional to develop applications for our Sycor 445 computer. Varied responsibilities include: design of financial applications programs, maintenance of technical expertise on software, scheduling and monitoring of Sycor's use.

Our ideal candidate will have a college degree with accounting courses and 2 years of COBOL programming experience. In turn, we can offer a challenging environment with high visibility, an excellent compensation package, and the opportunity for future advancement to our consulting staff.

Please send resume detailing your experience and salary requirements to:

NANCY LACEY

Arthur Young & Co.
1 IBM Plaza, 34th Floor
Chicago, IL 60611

Equal Opportunity Employer M/F

WE'VE GOT CONNECTIONS

The Holiday Season is an excellent time to reflect on the directions of your career in EDP. You may ask yourself if you're "connected" to your present job responsibilities, motivated by them? Are you really giving the best you have to your current position? Are you being recognized for your accomplishments? Are your long range goals coming any closer?

If you're disturbed by the answers to these questions, you may want to make a New Years resolution to do something about it. You can start by contacting the Jarvis Walker group.

We can help you make the right connections with intelligent, informed career advise and any number of challenging EDP opportunities. Connecting with us will re-connect you with your career.

the
jarvis walker
group

535 5th Ave., New York, N.Y. 10017 (212) 867-2650

position announcements position announcements position announcements position announcements position announcements

SYSTEMS/ PROGRAMMING

American Express has entered the direct mail marketing industry. Its newest Division, Direct Response, has a number of outstanding opportunities for career-minded, systems-oriented individuals who are willing to work hard and grow as we do. We are a service bureau, with DOS environment. We operate a twin IBM 360/65 configuration, running with a GRASP spooling system. We are expanding the need:

PROJECT LEADERS PROGRAMMER/ANALYSTS JUNIOR and SENIOR PROGRAMMERS

Who are looking for a challenge and an opportunity for career advancement. As a member of this growing Division, your opportunities for advancement lie not only within the Division, but throughout the whole American Express Company.

Candidates should possess:

- experience with third generation equipment;
- previous experience in COBOL, JCL and/or BAL;
- effective verbal and written communication skills;
- ability to work independently;
- ability to document programs efficiently and logically.

Our benefit package includes medical, educational assistance, incentive savings plan, pension and discount on travel tour packages.



If interested and qualified, please send your resume, in confidence, to:

Joseph N. Labita, Vice President, Personnel.

**AMERICAN EXPRESS
DIRECT RESPONSE DIVISION
175 Community Drive, Great Neck, N.Y. 11025**

An Equal Opportunity Employer M/F

SYSTEMS ANALYST

Individual with 2-4 years of systems experience, excellent analytical as well as strong oral and written communication skills. IBM 370 COBOL with emphasis on Consolidated Life Insurance Systems (ALIS/CFO/other). Degree preferred.

We offer competitive starting salaries, liberal company-paid benefits.

Apply in person, 8:30 a.m. to 4 p.m. Or call Eleanor Grant at 828-7000, ext. 226.

**BOSTON MUTUAL
LIFE INSURANCE COMPANY**

120 Royal St., Canton
(Near the Blue Hills off Rt. 138)

We are an Affirmative Action
Equal Opportunity Employer

Assistant Secretary of Human Services, Management Services, Commonwealth of Massachusetts

The Assistant Secretary has overall responsibility for coordination among 14 Human Services Agencies for systems development; EDP; systems audit; and manpower management, productivity and training programs. Minimum requirements: M.A., Admin. and 7 years' related professional experience in progressively responsible executive or administrative positions.

Attractive salary

Send resume to:

**Management Search
Executive Office of Human Services
167 State House
Boston, Ma. 02133
AA/EOE**

CONSULTING

We are a National Executive Search firm retained by several major firms with large, well established Management Consulting practices. Their continued rapid growth and promotions have created consultant openings at the middle and upper staff levels. These positions are located throughout the country and offer exceptional career opportunities for "fast track" caliber individuals.

Candidates should have an undergraduate degree and 3-8 years experience designing and implementing financial and other business oriented systems. Specialty skills in health care, manufacturing (MRF package implementation acceptable) or banking-and mini computer, performance evaluation and systems security experience are particularly desirable.

Salaries range upwards from 28K. Travel in most cases will average less than 25%.

For immediate confidential consideration for these and other positions, send your resume to:

**CW Box 2148, 375 Cochituate Rd., Rte. 30
Framingham, Ma. 01701**

or call one of our regional offices below:

BOSTON	(617) 227-9338
DENVER	(303) 779-4260
LOS ANGELES	(213) 625-0781
ORANGE COUNTY/	(714) 759-0515
SAN DIEGO	(312) 641-3040
CHICAGO	(713) 840-1032
HOUSTON	(212) 758-5151
NEW YORK	(404) 524-0879
ATLANTA	(214) 559-3260

Our clients are Equal Opportunity Employers M/F.

position announcements

position announcements

position announcements

position announcements

position announcements

COMPUTER SOFTWARE AND SUPPORT OPENINGS

IMS, recognized as the leading developer of DEC based software packages, has openings for people experienced in the development and support of on-line accounting, financial and manufacturing applications. Experience with RSTS/E or VAX/VMS a plus.

PROJECT MANAGERS

Responsible for overall management of customer projects. Emphasis is on project control, customer liaison, budgets and resource scheduling. Previous experience in project management of financial/manufacturing systems in a data processing environment is required.

DEVELOPMENT TEAM SUPERVISORS

Responsible for supervision of project team members, analysis of project requirements, scheduling and control. Will also serve as chief programmer. Required are B.S. degree plus 2-3 years experience in supervisory mode.

PROGRAMMER/ANALYSTS

Responsible for programmer duties plus assisting in development of application design specifications. Some client-user interaction. 2-3 years experience in programming/analysis required. Business background or degree preferred.

PROGRAMMERS

Responsible for coding, testing, debugging and documenting new and existing business applications. Will work as member of a project team. 1-2 years programming experience required. Basic-Plus and/or Basic-Plus II preferred.

PRODUCT SUPPORT SPECIALISTS

Responsible for customer installation, training and continuing support in use of business application products, marketing and sales support and development of user documentation. B.S. degree and good oral and written skills required, but no programming necessary. Openings in two areas:

Manufacturing and Distribution Systems. 1-2 years experience in Automated Order Processing and/or Inventory Control Systems required.

Accounting Systems. One year experience in automated G/L, A/R and/or A/P Systems preferred.

All positions provide major medical, dental, life insurance, paid vacations, tuition reimbursement ... and offer an excellent professional working environment.

Send your resume to Interactive Management Systems, Inc., 375 Concord Ave., Belmont, Mass. 02178, attention Patti St. Hilaire.

ims
INTERACTIVE MANAGEMENT SYSTEMS, INC.

AUTHORIZED **digital** COMPUTER DISTRIBUTOR

DATA PROCESSING

Marketing Manager

ADVANCED TECHNOLOGY GROUP

Spiridellis & Associates, Inc., a dynamic, growth oriented management consulting firm, serving Fortune 1000 Companies, is expanding our scope of operations. To implement our growth, we seek Management/Marketing Professionals with a high degree of self-motivation, ambition and initiative to share in our tremendous future.

Successful candidates must show a proven track record, as well as a thorough background in the Data Processing Industry. Ability of interface with Sr. level management essential.

Newly created High technology division of our management consulting firm seeks a unique individual with both broad State-of-the-Art technical exposure and management level marketing background to develop and execute market strategies. Position will shortly require management and administrative abilities in conjunction with procurement of a sales staff.

Please call or forward resume in confidence to:

Mr. Jim Egloff (212) 221-7270

Spiridellis & Associates, Inc.

1133 Avenue of the Americas
New York, N.Y. 10036

An Equal Opportunity Employer M/F

Software Specialists: GROW WITH THE PROS

Here's your chance to get involved with today's leading producer of computer software. And advance your career with some of the best professionals in the industry.

Right now, one of our most prestigious clients is looking for ambitious software specialists to join them. As a Massachusetts Data Base Software Firm, our client boasts a unique approach to computer software. Here you'll gain valuable experience as well as unparalleled recognition and rewards for your achievements.

If you're looking to make a really rewarding change, now's the time to contact Norton Kleven. After 10 successful years, our staff of former industry personnel can give you the finest confidential consultation around.

Database Systems Software Development

Positions require two or more years' experience in at least one of the following areas: systems programming for IBM or similar operating systems, plus a solid understanding of systems software design and implementation techniques. Experience in designing and implementing control systems software such as Database, Data-Communications, DataDictionary, Query, or Interactive Systems, Transaction Processing Systems, Tele-Communications Monitor, Network Protocols, or background in on-line applications, using 3270 type terminals in a TP Monitor Environment. Knowledge of interactive and pseudo-conversational programming techniques very helpful.

Auditing Package Software Development

Positions require formulation/development of new Report Generator/Retrieval Software Features to interface with new projects, and coding in IBM ASSEMBLER LANGUAGE additionally, formulation, design and implementation (using COBOL) of new product features and new environments for a financially directed software tool. Position affords exposure to a diversity of hardware, operating systems, and database management systems (DBMS). Hardware environments include IBM, Burroughs, NCR, Honeywell, Univac, and several mini-computer systems.

Technical Support Representatives

Will provide pre/post sales support to customer on the state-of-the-art data management products. Positions also involve participation in the design, programming, and implementation of in-house special projects. Background in IBM 360/370/303X/403X Mainframes (OS/DOS/VS). Database Management Systems or EDP Auditing is desirable. Good problem-solving and interpersonal communication ability is required.

So call Norton Kleven at (617) 861-1020, today and ask Bob Kleven about this exciting opportunity to join the best in computer software. Where you'll grow with the pros.

nk Norton, Kleven and Co., Inc.
INDUSTRIAL RELATIONS MANAGEMENT CONSULTANTS

Three Fletcher Avenue, Lexington, Massachusetts 02173
Telephone (617) 861-1020

Member
Massachusetts Professional Placement Consultants
National Computer Associates, Offices Nationwide
Representing Equal Opportunity Employers M/F

ROBERT HALF

MANUFACTURING SYSTEMS MANAGER

Put your technical and managerial skills to work for YOU and the BEST in this industry. The KEYS are your ability to design new systems and supervise the implementation. AND your ability to INSPIRE CONFIDENCE. Call me!

Amy Nielsen

ROBERT HALF OF CHICAGO

35 E. Wacker Dr.
Chicago, IL 60601
312/762-6930

• • • • •

MOVE SOUTH NOW!

Don't wait another winter! We work with over 1,000 sunbelt companies. Our computer will match your skills to their needs. Client companies pay all fees. Send resume to: Data Processing Dept.

LANDRUM
PERSONNEL ASSOCIATES
P.O. Box 1373C
Pensacola, Florida 32596
CALL TOLL FREE (800) 874-2487

PROGRAMMER

Must have one year experience in COBOL on IBM 370 and a good working knowledge of JCL, DOS-VS and CIS.

Salary: \$15,579 plus excellent fringe benefits.

Send written resumes to:

Summit County Welfare Dept.
Personnel Office
47 North Main Street
Akron, Ohio 44308

PIE IN THE SKY

Not here! Just complete reality! Most every D.P. shop or agency under the sun is telling you how they have the "right job for you". O.K., call any of them and see if they really offer:

NO TRAVEL - no off-site testing or implementation.

STATE-OF-THE-ART PROGRAMMING - utilizing our on-site IBM 3031 OS/MVT, 370/148 DOS/VS, B-2800 and System 34 computers.

GROUND FLOOR - in the design and development of new Banking applications systems.

CENTRAL FLORIDA - where you are able to live within walking distance of our lovely five-story lakefront office building.

WORLD'S LEADER - there are a lot of reasons why we're the world's leading supplier of financial software. Ask us!

GROWTH - our EDP Management team has been promoted from within. Our D.P. staff has grown by 400 percent in 18 months.

COMPENSATION - you will earn a nationally competitive salary without paying state or local income taxes, while enjoying a generally lower cost of living.

If you possess two or more years of experience in developing and/or enhancing banking or financing applications systems, call today, and we will discuss the "real" opportunities of joining our programming staff. To expedite your application and to insure you will be properly represented, we ask that you apply directly without the use of any agency by calling our toll free number or sending your resume to:

Don Quirk
FLORIDA SOFTWARE SERVICES, INC.
P.O. BOX 2289
ORLANDO, FLORIDA 32802
1-800-327-1892

An Equal Opportunity Employer M/F

position announcements

SYSTEMS ANALYST

Position available with rapidly expanding company located in lovely Williams Valley. Valuable profit sharing, fully paid insurance and dental plan, stock option plan and room for advancement. Applicant must have:

- Experience in design implementation, operation of real time or control systems
- Assembly language programming
- Field experience with industrial customers

Send resume and salary requirements to:

Francine Counihan
Personnel Supervisor
Applied Theory Assoc.
150 NW Lewisburg Rd.
Corvallis, OR 97330

PROGRAMMER

Responsible for systems analysis and software development of all management systems utilized for planning and accounting purposes by the Center for Computer Information Services.

Requires Bachelor's degree in Computer Science or equivalent work experience. Thorough knowledge of PL/I or COBOL. Knowledge of assembly language helpful to think abstractly or suggest creative solutions to problems as needed. Should have a broad knowledge of management systems.

Comprehensive fringe benefits program including educational opportunities.

Send resume (Ref. #131) with salary requirements to:

Division of Personnel
RUTGERS UNIVERSITY
New Brunswick, N.J. 08903
Affirmative Action/
Equal Opportunity Employer

RSTS/E BASIC + 11/70's

Small, rapidly growing Western Mass. based Consulting/Timesharing firm has immediate openings for experienced (1 to 3 years):

**PROGRAMMER ANALYSTS
SYSTEMS PROGRAMMERS**

Excellent compensation package and working environment. Please submit resume including salary requirements or phone.

ATTN: PETER STRALEY.

AMHERST ASSOCIATES INC.

Advisors to Health Care Management
210 Old Farm Road,
Amherst, Massachusetts 01002
(413) 258-8306

ROBERT HALF**BALTO/WASH
SOFTWARE MANAGER**

• Responsible for the Software Systems of a new Data Center including software selection & implementation, BS or Masters in Comp Sc & large IBM operating systems design exp. req'd. The corporation is extremely progressive offering excellent salaries and benefits plus relocation and interview expenses are covered. 35K.

• ROBERT HALF
OF BALTIMORE
217 The Quadrangle
Baltimore, Md. 21210
301-652-1960

• ROBERT HALF
OF WASHINGTON
7318 Wisconsin Ave.
Wash., D.C. 20014
301-652-1960

DATA PROCESSING**Manager
Marketing Director
Greenwich Office**

Spiridellis & Associates, Inc., a dynamic, growth oriented management consulting firm, serving Fortune 1000 Companies, is expanding our scope of operations. To implement our growth, we seek Management/Marketing Professionals with a high degree of self-motivation, ambition and initiative to share in our tremendous future.

Successful candidates must show a proven track record, as well as a thorough background in the Data Processing Industry. Ability to interface with Sr. level management essential.

Newly created Connecticut division of our management consulting firm needs high power individual to head up division. Responsibilities will include: Total management of operations and personnel, development and execution of market strategies, budget and administrative responsibilities.

We provide:

- Excellent Compensation
- Tremendous Growth Opportunities
- Excellent Benefits
- Expenses

Please call or forward resume in confidence to:

Mr. Jim Egloff (212) 221-7270
Spiridellis & Associates, Inc.

1133 Avenue of the Americas
New York, N.Y. 10036
An Equal Opportunity Employer M/F

**SOFTWARE DESIGNERS
• Space**

American Science and Engineering has outstanding opportunities for you to join our team of software specialists in exciting new development work for the most significant Space Physics Program of our time. You will be developing software for real-time operation, control, test and data analysis for various scientific space instruments. Experience in high level languages and microprocessor system design is required for this program.

AS&E has established a reputation for innovative solutions to some of the key challenges of our time over the past 21 years. If you are looking for an opportunity for stimulation and rapid career advancement, for a company that offers the advantages of belonging to the community of technical leaders, for recognition and reward, call C. Lee Binnig.

American Science and Engineering, Inc.
955 Massachusetts Avenue
Cambridge, Massachusetts 02139
(617) 868-1600

An Equal Opportunity Employer M/F

AS&E

Enter: FIELD OF YOUR CHOICE**Specify: YOUR SPECIALIZED TECHNICAL BACKGROUND**

Ques: Where can you find an exciting career that is extremely satisfying and rewarding?

Ans: **Allen Services Corp.** We are a young and aggressive DP firm with 16 offices nationwide. With ASC you will be a valued and respected member of a leader in the software industry.

Ques: Will your work provide challenges and the opportunity to enhance your technical skills?

Ans: Yes. ASC's progressive projects with companies throughout the nation allow for constant professional growth and diversity.

Ques: What else is so attractive about ASC?

Ans: You can really have fun here. We're an enthusiastic team working together to be #1 in Data Processing. ASC employees can look forward to bonuses, unique financial services, unequalled benefits, technical training on our new in-house computer system, and travel opportunity for management conferences.

Ques: What's the fastest way to learn more about Allen Services?

Ans: Call Toll free: **800-543-7583** (in Ohio: 513-890-1200)

ALLEN SERVICES CORP.

212 W. National Rd., Vandalia, Oh. 45377

Atlanta Detroit Indianapolis Newark Toledo
Chicago Hartford Los Angeles Pittsburgh Tulsa
Dallas Houston Naples Rochester Wilmington

At Allen Services, we care about our employees

Equal Opportunity Employer M/F



Programmer

**COBOL
PROGRAMMER**

Progressive Annapolis IBM 370 DOS/VS shop seeking person desiring challenge and responsibility in batch and on-line environments. Working knowledge of COBOL essential. Total DBMS and CICS experience helpful. Salary range \$15,605 — \$19,762 commensurate with experience and excellent benefits package. Send resume to:

ANNE ARUNDEL**COUNTY****Office of Personnel****P.O. Box 1831****Annapolis, MD 21401**

Equal Opportunity Employer M/F

**SR. SYS
CONSULTANTS
MANAGER**

We are a highly specialized consulting company looking for the following skills:

- VTAM NCP SNA INTERNALS
- IBM SPC's MVS SNS VM INTERNALS
- DIGITAL SWITCH SOFTWARE ARCHITECTURE

Salary or per diem

Also European assignment available
Call: George Colet — Chairman
(212) 228-5502

or: Gad Janay — President
(201) 575-8660

or write:

MAGDA CORP.
77 E 12th Street,
New York, N.Y. 10003**MANUFACTURING SYSTEMS
SR. PROJECTS LEADER**

\$30,000 RANGE

Exeter Associates, Inc.

NATIONAL RECRUITING CONSULTANTS

Bruce A. Montville
Managing Partner
(603) 926-6712



Computer Park
Hampton, N.H.
03842

**FLY
SOUTH
FOR THE
WINTER**

Join our Computer Services Division in the South. Beat the snow and GO with Sigmatics. Opportunities available for software professionals with a minimum of 3 years' experience in most Southern cities: Miami, St. Petersburg, Ft. Lauderdale, Atlanta, Chattanooga, Birmingham, New Orleans, and other choice locations. Contact any of the following Sigmatics offices by phone, collect, for details.

BOSTON:

Pat Kelly
591 North Avenue
Wakefield, MA 01880
(617) 245-6598

PHOENIX:

Ron Locke
3225 N. Central
Suite 318
Phoenix, AZ 85012
(602) 256-0466

SAN FRANCISCO:

No. California Branch
G. Earl Winters
100 North Winchester Blvd., Suite 260
San Jose, CA 95128
(408) 248-8940

ATLANTA:

Van Frier
340 Interstate North
Atlanta, GA 30339
(404) 953-1220

LOS ANGELES:

Pete Bodman
15300 Ventura Blvd.
Suite 223
Sherman Oaks, CA 91403
(213) 788-6314

WASH./BALTIMORE:

Bob Slade
9811 Mallard Drive
Laurel, MD 20811
(301) 953-1217

ORANGE COUNTY:

Ed Hearst
4500 Campus Drive
Suite 21
Newport Beach, CA 92660
(714) 836-6681



SIGMATICS

position announcements

position announcements

position announcements

position announcements

position announcements

ALLIS-CHALMERS needs

- SYSTEMS ADMINISTRATOR
- APPLICATION PROGRAMMERS

Our newly established Information Systems Department has immediate openings for a Systems Administrator and Application Programmers. Preferably candidates should have a BS degree in Business, Computer Science, Engineering, Industrial Management or Math.

Candidates for the "Systems Administrator" position must have 3 years experience in Data Base Management, RSTS/E and the BASIC programming language.

Applicants for the "Application Programmer" position should have a minimum of 1 year experience using BASIC, preferably with D.E.C. equipment. Additionally, COBOL experience is highly desirable.

Working environment includes utilization of a D.E.C. PDP 11/70 system to support interactive applications in the areas of Manufacturing Control, Project Management, Finance and Marketing. Mail your resume in confidence to or contact:

Mr. H. L. Banks, Jr.
Supervisor of Recruiting
(717) 848-1126 Ext. 470

ALLIS-CHALMERS CORPORATION

500 Lincoln Street

York, PA 17404
An Equal Opportunity
Employer m/f

FLORIDA

Our Miami area clients demand experienced top-notch System Analysts and COBOL Programmers from us immediately. If you have 2-5 years experience on large scale IBM 370/OS systems and are one of the best, send resume and salary history to:

Bruce Hilton
ADVANTAGE EXECUTIVE SEARCH, INC.
7861 Bird Road
Miami, Florida 33155
(305) 264-7060

Fee, travel, and relocation company paid. No Contracts.

Job Opportunities Are Waiting For You In The Sunny Southwest!

Arizona Public Service Company is in the process of expanding our EDP department to provide state-of-the-art computer support for business, engineering, scientific and special purpose applications. Excellent opportunities exist for qualified people in the following positions:

PROGRAMMER ANALYST to work in financial accounting, inventory management, customer information, project accounting, payroll personnel, and other supporting business applications.

SYSTEMS PROGRAMMER large 370/168 installation running MVS 3.7, JES 2, IMS/VS 1.1.5, TSO with SPF via state wide privately owned T/P network.

SYSTEM ENGINEER for analytical and scientific application, design and development for engineering and operation.

ENERGY MANAGEMENT SYSTEM ENGINEER for real-time operating systems interrupt processing SCADA, man-machine interface and advanced power system applications. Prefer experience with assembly language, Leeds and Northrup LN-550 or IBM 370.

All of the above positions require a BS degree in engineering, math, physics, or computer science with a minimum of 2 years experience, preferably with IBM 370/168.

We offer an excellent salary, benefits and promotional opportunities in addition to the casual lifestyle of the Southwest. Please send detailed resume to: Bryan Turgesen, Arizona Public Service Company, P.O. Box 21666 Station 1102, Phoenix, Arizona 85036.

We are an equal opportunity/affirmative action employer

aps!

Career opportunities in Europe

BSO/Automation Technology, a major Dutch software house is looking for professionals with a background in technical, scientific or systems software or hardware to join a growing specialist

group. We are looking for people seeking a long-term career in a software and systems house environment rather than a short stay abroad. We need

Systems designers

to \$ 36.000
plus car and expenses

Experience in the design of real-time or control systems based on mini or micro computers. 5 years experience in Automation and a BSc or equivalent are minimum requirements. Knowledge of Assembler is essential. Experience with any of Interdata 32, DG Nova or Philips 800 an advantage.

Analysts

to \$ 30.000
plus car and expenses

Experience in the development and installation of real-time or control systems based on mini or micro computers. Ability to talk to hardware engineers is important. 3 years experience in Automation and a BSc or equivalent, preferably in computer science or electronics, are minimum requirements. Experience of Interdata 32, DG Nova or Philips 800 would be an advantage. Knowledge of Fortran or Basic and Assembler is necessary.

Programmers

to \$ 26.000
plus car and expenses

Experience in programming real-time and control systems in Assembler for mini or micro computers. Neatness and accuracy are vital. A minimum of 2 years experience and a BSc are required as is programming experience in Assembler. Experience of Interdata 32, DG Nova, Philips 800 or Intel 8080 would be an advantage.

MUMPS programmers

to \$ 26.000
plus car and expenses

Minimally 2 years programming experience of which at least 1 year must be solid MUMPS. Experience of one other language required. Training in standard MUMPS will be given if necessary.

Microprocessor development engineer

to \$ 30.000
plus car and expenses

Experience in the development of microprocessor based industrial products or systems with good knowledge of hardware or interfacing problems. 5 years in computing or electronics, ideally with Intel 8080/8085 or Zilog 80 experience. Knowledge of Assembler and at least one high level language is necessary.

The company offers tax free expenses, assistance with medical insurance and a company car covering private use at no cost to the employee. A relocation allowance of \$ 2.500 up to \$ 5.000 depending on family status plus flight to Holland will be provided. Other excellent fringe benefits and almost 5 weeks vacation. Career opportunities to consultant or project management level are available in a growing company. The company is currently busy on a number of different projects using various hardware, including micros.

Applicants to these unique opportunities are requested to send their detailed resume, preferably with photograph, to BSO/Automation Technology. Interviews are scheduled to be held in the U.S. during January 1980.

Mail to: BSO/Automation Technology b.v.
P.O. Box 3059,
3502 GB Utrecht
Netherlands

BSO/Automation Technology bv

Koningin Wilhelminaalaan 5, P.O. Box 3059, 3502 GB Utrecht.
Phone: 011 - 3130946746.

FIELD ENGINEERS:

HERE is a dynamic rapidly growing company specializing in equipment sales and maintenance world-wide.
NOW is your opportunity to join a company that has pride in its people.
ASC is a people oriented company...no more being just a number or another F.E.
THIS is an excellent opportunity for talented F.E.'s to obtain recognition and advancement, financially and otherwise.
WE have openings in commercial and government accounts nationwide. Technicians specializing in:

DEC 10/11, XL & XL
DEC 11 Series, DEC 20
G.E. Honeywell
Minis...and your requirements for ASC
4000 Duke Street, Suite 808
Alexandria, Virginia 22303
(703) 823-1550

AMERICAN STANDARD COMPUTER CORP.

PROGRAMMER or PROGRAMMER/ANALYST

Due to a reorganization within our Data Processing department, we have an immediate opening for an individual who has a minimum of 2 to 3 years BAL experience in a DOS environment, preferably with a Financial institution. The person we select will be given an opportunity to work in all facets of our On-Line systems.

COBOL and REAL time experience helpful, but not essential.

If you want to work in a challenging environment and are looking for a professional growth position, then you should consider us.

Excellent starting salary with many company paid benefits.

Please send your resume, in complete confidence, including experience and salary requirements to:

CW Box 2147
375 Cochituate Rd.
Framingham, MA 01701
Equal Opportunity Employer M/F

position announcements

position announcements

position announcements

position announcements

position announcements

DATA PROCESSING PROFESSIONALS



The corporate computing services department of a Fortune 500 company has immediate openings for experienced data processing professionals.

PROJECT LEADER

The person in this position will be designing and implementing a new on-line manufacturing system on an IBM 4341 computer. Should have 5 years systems and programming experience with at least 3 in manufacturing systems. Must have previous project leadership. Degree desired but will accept equivalent experience. Data base design a plus. Interested candidates should submit their resume and salary history to Len Kizer, Manager Systems and Programming.

PROGRAMMER ANALYSTS

- Large IBM hardware experience in COBOL, PL1, and OSJCL. Exposure to PANVALET CICS, and data base management concepts a plus.
- Small IBM system experience in RPG, S-3, S-32, S-34, SERIES-1. Interested candidates should submit their resume and salary history to Herb Menard, Manager Application Planning and Development.

These positions are offered at our corporate computer center in Grand Rapids, Michigan. Compensation includes an excellent salary, a comprehensive benefits package, and the opportunity for career growth.

LEAR SIEGLER

Corporate Computing Services
4141 Eastern Ave., SE
Grand Rapids, Michigan 49508
Equal Opportunity Employer M/F

Contract Consultants

Short Term Assignments

Control Data Corporation conducts an extensive Data Processing and Management Seminar program throughout the world. We are looking for experienced professionals who have technical expertise, instructional ability and a record of consistent performance.

If you are an independent consultant and qualified to conduct short courses in the following subjects, we're interested in meeting with you to discuss your capabilities and our requirements.

Data Management
Microprocessing
Computer Operations
Small Business Computing
Minicomputers
Systems Analysis & Design

Software Engineering
Project Management
Computer Science
Documentation Standards
Distributed Systems
Structured Design & Test

To arrange for an interview, please write or call collect:
Control Data Corporation
c/o H.A. Coch
2025 Gateway Place, Suite 411
San Jose, CA 95110
(408) 280-2017

GD CONTROL DATA CORPORATION
More Than A Computer Company
An Affirmative Action Employer

MIS Manager

As the world's leading producer of interactive computer systems, Digital Equipment Corporation continues to expand its LSI manufacturing businesses for our computers. Our newly constructed facility in Hudson, Mass., has an opening for a MIS Manager. This individual will define the business systems requirements for the semiconductor manufacturing facility, and manage systems support projects to provide management information for the control of work-in-progress lines. Application projects will primarily include areas of product control, and process control systems.

Candidates should have a BA/BS or equivalent with at least five years experience in systems development/implementation, project management, and commercial application, plus strong written and verbal skills. This position will require the ability to communicate with all levels of LSI management; including materials finance, manufacturing and process engineering. Previous experience is a must. MBA or DECsystem 10, COBOL experience is helpful.

If you are interested and qualified, please forward your resume to: Richard Kisiel, Digital Equipment Corp., MO/P53, 274 Cedar Hill Road, Marlboro, MA 01752, or call COLLECT (617) 481-9511, ext. 6400. We are an equal opportunity employer m/f.

digital

TOLL FREE 800/633-6644

In Alabama Call Collect
(205) 833-3467
24 Hr. Telephone Service

SUNBELT SERVICE

S/3 MOD 10
S/3 MOD 12
S/3 MOD 15
SYSTEM/32
SYSTEM/34

We are currently recruiting for a number of openings in System/3, System/32 and System/34 shops throughout the South. Starting salaries range from \$15,000 to \$30,000. All fees paid. No contract required. Call toll free or mail resume for fast, confidential service.

Ole Olson — Rick White

GENERAL PERSONNEL CORPORATION
213 Gadsden Highway
Birmingham, AL 35235

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Established center for Biological and Environmental Sciences seeks experienced programmer/analyst for 1 year appointment to assist in development of PDP-11 production software. Qualifications include minimum 2-3 years experience with RSTS/E, BASIC +2, RMS 11K, and data base management techniques. Exposure to IBM OS JCL helpful. Salary 15-20 K, commensurate with experience. Send resume to:

Academy of Natural Sciences of Philadelphia
19th and the Parkway,
Philadelphia, PA 19103
Attn: Charles McIlroy

COMPUTER PROFESSIONALS

MIT's Dept. of Computer Science and Electrical Engineering is seeking experienced professionals to support systems using a DEC 2060 computer and the TOP's 2 operating system:

Operations Manager: 2 to 3 years' experience, preferably with TOPS required. Bachelor's degree preferred (Job No. C79-33)

Operations Manager: 3 to 5 years' systems programming experience required. Will manage this and other departmental computer systems. Hardware experience preferred. (Job No. C79-34)

Please submit resume indicating job number to: MIT Personnel Office, 400 Main Street, Cambridge, MA 02139. An equal opportunity/affirmative action employer.



GREATER SOUTHEAST COMMUNITY HOSPITAL

1310 Southern Avenue, Southeast Washington, D.C. 20032

THE CAPITAL PLACE

We are a modern, progressive medium size hospital located in Washington, D.C. Promotions have created two challenging opportunities for YOU.

• **PROGRAMMER/ANALYST**, requiring 3-5 years COBOL programming experience plus working knowledge of IBM Systems 370/138, DOS/VS, CICS, DL/1, on-line environment.

• **SYSTEMS PROGRAMMER** also requires 3-5 years systems programming experience and current knowledge of DOS/VS, DOS/VSE, CICS, VM, DL/1 preferred.

Candidates for these positions must also have strong interpersonal skills to interface with management, user departments and staff members. The selected applicants will enjoy a very comprehensive benefits package that includes, premium paid health & life insurance, tuition reimbursement, tax-shelter & professional development.

Address your resume, in complete confidence, to Employment Manager.
An Equal Opportunity Employer

position announcements

position announcements

position announcements

position announcements

position announcements

SYSTEMS ANALYST COMPUTER APPLICATION

Seeking an EDP auditor or a systems analyst that is willing to learn EDP auditing. Knowledge of:

- Fast Response Systems
- Systems Applications
- Teleprocessing
- Computer Operations

Must interact with DP and user groups and communicate effectively. Based at our new computer center in Bakersfield, California.

Tosco is a rapidly growing diversified energy company engaged in oil refining and marketing, coal production and oil shale development. Excellent salary and the best industry benefits. Please send resume with salary history and requirements in complete confidence to:

TOSCO CORPORATION
Ms. Jan Leavitt
P. O. Box 2860
Bakersfield, CA 93303
(805) 397-2000

EQUAL OPPORTUNITY EMPLOYER, M/F/H



Software Engineering Development Manager— Data Communications Software Development

A major new hardware/software development program requires a line Software Manager capable of directing and coordinating efforts within a highly skilled, highly motivated group.

This position requires an individual with a working knowledge of current software quality and schedule control tools, and a good, solid technical foundation in data communications. Good written and oral communication skills are a prerequisite, as are a B.S. in a technical discipline or equivalent with a Master's degree preferred.

If you equate high visibility, technical challenge and fast pace with a great career opportunity, then these positions should interest you. Please forward your resume, including salary history, to Joe Hart, Digital Equipment Corporation, Dept. A1210 3807, 1925 Andover Street, Tewksbury, Massachusetts 01876. We are an equal opportunity employer m/f.

digital

ALBRIGHT COLLEGE
A small liberal arts institution situated in South-Eastern Pennsylvania, seeks a person with background in data management, information systems, software engineering to teach undergraduate courses in a recently instituted and currently expanding computer science curriculum. Especially sought are individuals with C.D.P. industry experience and supportive academic credentials. Computer resources include several minicomputers and a large DEC 11/10 month academic contract with summer teaching available. Rank and salary are open. Apply to:

Dr. Arthur Hirsh
Dept. of Mathematics
and Computer Science
Albright College Reading, PA 19603
Albright College is an Equal
Opportunity Employer.

SAN DIEGO STATE UNIV. FACULTY POSITION INFORMATION SYSTEMS

Tenure-track position available fall 1980. Candidates should be experienced in business data processing. Preferred specialties: program languages, systems design, data base management, data communications, and operating systems. Doctorate or ABD in information systems or related fields required. The department offers MBA, MS and BS in Information Systems. Please send resume to Dr. Michael J. Madole, Information Systems Department, San Diego State University, San Diego, CA 92182. Equal Opportunity/Affirmative Action/Titl IX Employer. SDSU does not discriminate against handicapped persons.

COMPUTER ENGINEERS

Aramco offers world's biggest projects, up to 40% premium, and unique travel opportunities.

A chance for unparalleled professional experience, good promotion opportunities, and a unique combination of income and travel benefits await qualified engineers.

Read how you could improve your income and career. Aramco is the principal oil company helping develop the energy resources of Saudi Arabia. Projects are staggering in scope, complexity and imagination, and nowhere else in the world is modern technology being applied so widely.

We pay more because you're worth more

All of this takes a lot of people—people we are ready to reward with up to 40% tax-protected premium, 40 days' paid vacation every 12½ months, good living, excellent education for children, and good opportunities for promotions and career development. Read below about the people we want.



CHALLENGE BY CHOICE

ARAMCO
SERVICES COMPANY

DIAGNOSTIC PROGRAMMER for sunny SOUTH FLORIDA

Major computer manufacturer offers growth position within its development group working on communications. Call Ray 305/741-1801 or send resume to C & A, INC., 2300 University Drive, Sunrise, Florida 33322.

E.S. RANDO ASSOC.

EDP
Placement
Consultants

Programmers
Analysts
Proj. Leaders

New
England
and
nationally

274 Main Street
Reading, MA 01867
(617) 944-0990

PROGRAMMER/ANALYSTS

The Louisiana Land and Exploration Company, an aggressive independent NYSE oil and gas company (Fortune 500), is seeking professional Programmer/Analysts to support our commitment for growth in our Corporate Information Systems Department.

If working in New Orleans, Louisiana; superb professional growth opportunities, plus rapid expansion are stimulating to your career and your qualifications include a B.S. in Math, Computer Science, or Business with COBOL, CICS, DLI, DataBase and on-line experience, we would like to hear from you.

Compensation, Benefit package and relocation policy are excellent. Please send resume and salary requirement to:

Thornton Kuntz



**THE LOUISIANA
LAND AND EXPLORATION
COMPANY**

P.O. Box 60350
New Orleans, Louisiana 70160
An equal opportunity employer m/f

position announcements

position announcements

position announcements

position announcements

position announcements

DATA PROCESSING

RMS, a Citicorp Retail Merchant Services Company, is seeking people who are looking for challenging positions with excellent growth opportunities.

PROGRAMMER/ANALYST

2-3 years of experience in Online applications, CICS (command or Macro level), COBOL and DOS/VS. VSAM and AL is desirable.

DATA COMMUNICATIONS

Experience in solving Data Communication problems. Knowledge of mini-computers and related equipment. PDP 11 experience is desired.

We offer an excellent salary and benefits package which includes Health and Dental insurance and free parking.

Call Harry Kowal at (303) 779-3500 or mail your resume and salary requirements to:

RMS
P.O. Box 1558
5889 S. Syracuse Circle
Englewood, Colorado 80110
Attn: Systems

Equal Opportunity Employer M/F

SAN FRANCISCO and BAY AREA

RELOCATION, INTERVIEW AND FEE ARE PAID BY MANAGEMENTSEE BELOW FOR PARTIAL LISTING OF OPPORTUNITIES

TSO Technical Team Leader: Required. Supervisory experience, strong, user contact skills, background in COBOL, MVS, TSO.

Sc. Systems Analyst: Required. Design & Imp of major integrated mtg control systems in data base environment. MRP, engineering change, job costing.

Programmer/Analyst: Required. PL1, personal income tax experience. Will work with CPA's to develop test imp computerized plan system for clients.

Sc. Programmer/Analyst: Required. Degree, 6 years COBOL. Will define, develop and guide systems development, some project management duties.

Sc. Systems Programmer: Required. 370 OS/VS and minimum of 3 years as systems programmer. Looking for strong people to work in dynamic growth environment.

Teleprocessing Analyst: Required. 3-5 years terminal operations (IMS) with good documentation background. Good user contact skills, multiple openings.

We have other opportunities in Data Base Administration, EDP Auditing Programming, Project Leadership, Systems Analysis and Operations Management.

ROBERT HALF OF NORTHERN CALIFORNIA EDP SEARCH SPECIALISTS

Jerry Anderson
or
Bob Couch
111 Pine Street
San Francisco, Ca. 94111
(415) 434-1900

Sixty Offices Nationwide
Client companies assume our charges.

Rich Abreau
or
Jim Dupre
2 Palo Alto Sq. 8020
Palo Alto, Ca. 94304
(415) 493-8700

REGIONAL SALES MANAGER CHICAGO AREA

Major software company selling IBM systems products seeks a proven performer to manage its Midwestern territories. Responsibilities include direct supervision of regional sales and service personnel. Preferred experience includes some technical experience with IBM software systems, a knowledge of the software products marketplace, and successful sales management. Compensation range \$30,000-76,000 based on performance. Excellent benefits.

CW Box 2143
797 Washington St.
Newton, Ma. 02160

Manager Teleprocessing Systems

We are currently seeking a high caliber individual to direct the planning, development and implementation of the Teleprocessing Systems at Levi Strauss & Co., the world's largest apparel manufacturer.



You will supervise a staff of Systems Programming Teleprocessing Specialists involved in the following areas:

- IMS DB/DC as the on-line system monitor for major applications.
- TSO network for application development and testing.
- Batch transmissions to field locations.
- System Network Architecture implementation as a future project.

To be successful you should have 5-7 years' experience as an IMS Systems Programmer, 3-5 years' experience as a Manager of a Systems Programming group, the ability to direct the use of systems facilities and related program products, as well as administer a

cost center with personnel related functions. Desirable qualities include previous implementation of network management functions and a background in on-line system application design and implementation.

We are a rapidly expanding company that encourages personal and technical advancement. In addition to a competitive salary we offer an excellent benefits package.

If you are interested in participating in our state-of-the-art environment, please send your resume with salary history in confidence to: Ms. Donna Filippello, Data Processing Specialist, Levi Strauss & Co., 55 Francisco, San Francisco, CA 94133.

We are proud to be an equal opportunity and affirmative action employer.

LEVI'S
LEVI STRAUSS & CO.

QUALITY NEVER GOES OUT OF STYLE

SYSTEMS PROGRAMMER

This position requires 5 or more years experience supporting DOS/VS, CICS and POWER/V/S environment.

Experience with ETSS, DMS & APL system is a definite plus.

We are planning to convert to VSE and 4300 series next year.

Excellent company paid benefits including free parking.

If you meet these requirements, send resume with salary history and requirements to:

Personnel Department

**U.S. NEWS
& WORLD REPORT**
2300 N Street, NW
Washington, DC 20037

Equal Opportunity Employer

COMPUTER PROFESSIONALS

Safelite is a Safety Glass Manufacturer, Wholesaler & Retailer located in Wichita, Ks. We have employment opportunities in the following areas:

D.P. MANAGER

You should have 6-8 years commercial Data Processing with current systems & programming skills, have IBM equipment knowledge of Systems 3, Model 15 and Systems 34. Training and supervisory skills are desired.

PROGRAMMER/ANALYST

Senior

4 - 6 years of growing experience with current programming skills in RPG II, IBM Systems 3 and 34. Manufacturing and/or Accounting background helpful.

We offer a highly competitive salary, fringe benefits and personal growth. Explore these challenging opportunities by forwarding a resume including salary requirements to:

Safelite
Dan Northrop, P.O. Box 1879
Wichita, Kansas 67201

LSI **Safelite**
A LEAR SIEGLER COMPANY
equal opportunity employer M/F

HOUSTON OVERSEAS POSITIONS

Bus, Sys Analyst ... \$25-45,000
PL/I Trainer \$20-30,000
Hdwre/Sftw Planner ... \$20-35,000
Tech Writer/Stds ... \$18-30,000
DBA-IMS \$20-35,000
Sys Programmers ... \$20-35,000

HOUSTON COMPANIES

DBA (5) IMS \$26-35,000
Sys Prog — OS \$26-35,000
Mark IV P/A \$25-30,000
PL/I-Cobol Prog \$20-28,000
P/A — IMS \$18-24,000
P/A — CICS \$18-23,000
Sys Prog — RSTS/E \$18-28,000
Sys Prog — RSX/IIM \$18-24,000

For further information on these positions or other current openings, please call Jim Fleming at 713-757-1144 collect or send your resume to:

EDP PLACEMENT SPECIALISTS

**ROBERT HALF
EDP DIVISION**

Two Allen Center, Suite 1700,
713/757-1144
Houston, TX 77002

MARKETEERS

IBM, Xerox, ITEL and other Sales Professionals

To \$100,000

If you're better than good ... and getting even better ... but not getting paid enough for your talent ... read on. We're looking for aggressive, high-energy marketing experts with outstanding records at IBM, Xerox and other major firms, PLUS solid professional sales training background and the drive to earn really big money.

You will help wealthy investors protect their capital via tax-sheltered energy-related investment vehicles. Your income and growth potential are up to you — the AVERAGE income of our client's Sales Associates in 1978 was \$73,500, and 33% earned more than \$100,000. Don't miss this chance. Send your resume in confidence today to Mr. H. P. Leinbaugh. An equal opportunity employer m/f.



**Janus
Consultants,
Inc.**

1212 Potomac St. N.W.
Washington, D.C. 20007
(202) 333-0100

position announcements

position announcements

position announcements

position announcements

position announcements

Marketing/Computer Performance Analysts

Digital's Commercial Marketing organization is seeking qualified individuals to join us in Performance Marketing Analyst positions. As a member of a high visibility, high impact Performance Marketing team, this is an outstanding opportunity for you to use, and further develop your technical, marketing and personal communication skills.

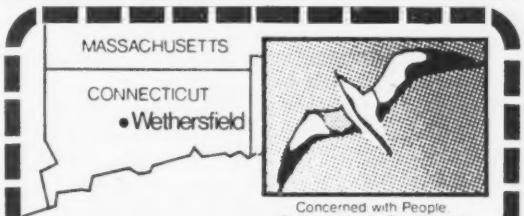
Individuals will be responsible for understanding commercial workloads and measuring and characterizing system performance for marketing, sales and product development. You will use Digital's most comprehensive performance measurement facility with solid support from Engineering on performance tools and methodologies. Applicants should have a technical degree, or equivalent in training and experience, and significant exposure to the problems of programming or designing high performance, high production computer systems. Superior writing and presentation skills are also required.

If you are interested in, and qualified for, this challenging position, please forward your resume, including salary history, to: Gary Hughes, Digital Equipment Corporation, Dept. L1210 3807, Continental Boulevard, Merrimack, New Hampshire 03054. We are an equal opportunity employer m/f.

digital

WANTED

Faculty Member
(One Year Replacement)
to teach BASIC language to
Freshman and Sophomore Engineering Science Students
APL and APL PLOT-10
\$20,000 plus Benefits, depending on experience
Contact Robert Keough, Chairperson
SUNY at Alfred
Alfred, NY 14802
607-871-6197



NORTHEAST UTILITIES IS

Paying for Motivated
Computer Professionals
with Large Systems Experience
(IBM 370/3033 - 158)

• ANALYST PROGRAMMERS

18-24K

• METHODS ANALYST

18-24K

We offer excellent benefits, salary, and growth opportunities.
Please forward an up-to-date resume or call:

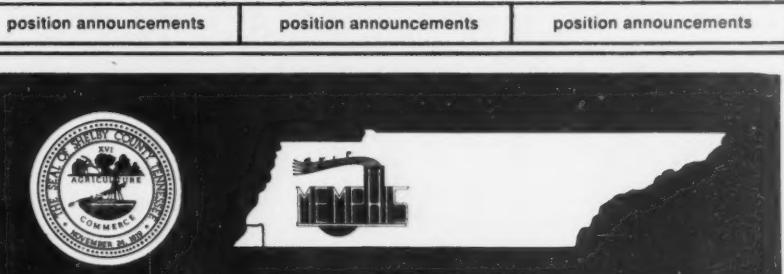
Ms. Linda Heidenreich

NORTHEAST UTILITIES

P.O. Box 270, Hartford, Ct. 06101
(203) 866-6911

THE CONNECTICUT LIGHT AND POWER COMPANY
THE HARTFORD ELECTRIC LIGHT COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLLYWOOD POWER & LIGHT COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

An Affirmative Action, Equal Opportunity Employer



DATA PROCESSING CAREERS

with
SHELBY COUNTY, TENNESSEE

One of the Mid-South's largest data processing shops is expanding. The nerve center of Shelby County Government (located in downtown Memphis) has immediate openings for experienced data processing professionals.

SYSTEMS ANALYST: Bachelor's degree in DP related field and two years experience as Systems Analyst or Program Analyst; or equivalent education and experience.

PROGRAMMER ANALYST: Associate degree from accredited data processing school, with courses in COBOL, and three years actual work experience in COBOL programming; or equivalent education and experience.

— Salary Compensation with Experience and Ability —

- 1. Excellent career development opportunities.
- 2. 10 days vacation and 12 days sick leave 1st year.
- 3. Bonus days may be earned.
- 4. Excellent pension plan — Credit Union.
- 5. Life, dependent life and Blue Cross medical insurance at low cost.
- 6. Free parking / car pools — and more!

Call collect for Sam Edge between 7:30 a.m. & 5:00 p.m. cst. at (901) 528-3388

— or write to —

SHELBY COUNTY PERSONNEL DEPARTMENT
Suite 901 — 160 North Mid America Mall — Memphis, Tennessee 38103

All inquiries & applications will be handled in strictest confidence

EQUAL OPPORTUNITY EMPLOYER

PROGRAMMERS & ANALYSTS Exciting Careers In Seattle

Why not accelerate your career & have fun while doing it! Enter an exciting on-line environment where your ideas of today become working solutions tomorrow. Our client is one of the leaders in state-of-the-art on-line systems. Computers are their business... not just an overhead staff function. For COBOL and FORTRAN problem solvers, IMS or CICS experience is a definite plus. If you are currently employed in Seattle or would consider relocating to this area, call JIM CHURCH or ANDY BLACKSTONE at (206) 453-4800 or send your resume. All replies will be treated confidentially.

Jordan, Stern & Reed, Inc.
Corporate Search Firm

2122 112th Avenue N.E.
Bellevue, Washington 98004

100% Client Retained

DIV SYSTEMS R+D

\$40-50,000 + BONUS +

Total resp 35 professionals design + developing complex mini-based software systems and custom I-O devices. THE key technical dept in corp experiencing 7 yrs of sustained 20% per growth. Rec demonstrated achievements managing sophisticated software/hardware function. Attractive suburban Mid-Atlantic location. Client assumes our fee and normal relocation expenses. Contact in conf H. Greene, 302/278-5150 FOX-MORRIS PERSONNEL CONSULTANTS, 200 Shipley Bldg., Concord Plaza, Wilmington, DE 19801.

Programmer/ Systems Analyst

Only an industry leader like Bendix Environmental & Process Instruments Division can offer you all of the following:

- Liberal relocation assistance to Lewisburg, West Virginia—a notably stress-free and picturesque area away from heavy industry and mining activity.
- Opportunity to work at our modern headquarters... where we're developing and producing innovative environmental and industrial process instrumentation.
- Fully commensurate salary and top benefits.
- Ample room to advance within an organization that has more than doubled its sales in the past two years.

To qualify, you must have an Associate's degree (or equivalent background) and at least two years of experience in: IBM S/3 Model 15D with working knowledge of RPG II and CCP; IPICS and manufacturing systems, and on-line purchasing/receiving systems.

To apply, please call Gil Patton or Kay Donovan at (304) 647-4358. Or send resume indicating position of interest to: Employee Relations Department, Bendix Environmental and Process Instruments Division, P.O. Drawer 831, Lewisburg, West Virginia 24901.

An equal opportunity employer, m/f



Environmental &
Process Instruments
Division

We speak growth.

position announcements

position announcements

position announcements

position announcements

position announcements

MORE GOOD PEOPLE!!!

Data-Design Laboratories is looking for a select few senior applications analysts to join our Information Systems team. We are engaged in the development of on-line management applications in a multi-minicomputer environment. Applicants should have strong experience in minicomputer applications (DEC/RSTS preferred) and should be qualified to lead small project teams. DDL offers the potential for a challenging career with a growth-oriented company. If you believe that you meet these qualifications and are interested in more information, please send your resume to Larry Murphy at:

Data-Design Laboratories
P.O. Box 711
Cucamonga, California 91730
(714) 987-2511
an equal opportunity employer m/f/h



Programmers/Analysts

A rare opportunity to join a small, growing, suburban Washington, D.C. based engineering, management and computer systems company.

OAO CORPORATION has expanded its staff to over 400 personnel during the past 6 years. We are continuing our growth under new programs with the FAA at the National Aviation Facilities Experimental Center (NAFEC) near Atlantic City, New Jersey.

We are seeking Programmers and Analysts with experience in the following areas:

- TRANSACTION DRIVEN SYSTEM
- NATIONAL AIRSPACE SYSTEMS
- JOVIAL/FORTRAN
- TEST SPECIFICATIONS
- COMPUTER HARDWARE
- REAL TIME SYSTEMS
- ASSEMBLY LANGUAGES
- DATA BASE MANAGEMENT
- SIMULATIONS
- COMMAND AND CONTROL
- IBM 3020 or 360/370

These positions provide excellent salaries and a benefits program which includes 3 weeks vacation, profit sharing and a major medical/dental insurance program.

For further information and prompt confidential attention, send your resume to:



Dept. CW
P.O. Box 615
SEABROOK, MARYLAND
20801

An Equal Opportunity Employer M/F/H/V

SYSTEMS PROGRAMMER-MVS

Large scale MVS company seeking experienced Systems Programmer with minimum two years experience in System Generations, monitoring and tuning techniques, debugging and analyzing Software errors and maintaining an MVS System with SMP. Knowledge of JES2 and assembler language is a plus.

Large scale complex includes 3033, 16BAP and 158MP. Starting salary commensurate with experience. Send your resume to:

Wisconsin Telephone/Management Employment Office
722 North Broadway ASC-12/Milwaukee, Wisconsin 53202
An Equal Opportunity Employer

COMPU SEARCH

Our career is finding one for you.

When you're ready, we are: CompuSearch, a division of Management Recruiters International, specializes in the placement of EDP and related industry personnel. In 1978, we placed 27,000 people. What sets us apart? Our people. Professionals. Talk with them about your aspirations. They'll put their minds to it. Better yet, find a better position for you. Phone our office. There's nothing to lose, but a lot to gain. Like a better life.

Albany, NY 518/459-5713
Ann Arbor, MI 313/764-1729
Appleton, WI 414/731-5221
Arlington, TX 817/469-6161
Atlanta-Northwest, GA 404/956-2785
Baton Rouge, LA 504/927-4700
Boston, MA 617/262-1000
Buckley City (Phila. area), PA 215/587-1543
Cincinnati, OH 513/651-5600
Clearwater, FL 813/725-1651
Cleveland, OH 216/623-1037
Cleveland-West, OH 216/221-4700
Columbia, MD 301/990-1000
Columbia, SC 803/779-8272
Columbus, OH 614/436-3200
Dallas, TX 214/750-9023
Dayton, OH 513/228-8271
Dearborn (Detroit), MI 313/336-5000
Frederick, MD 301/662-0000
Gainesville, FL 800/226-9861
Houston, TX 713/850-9860
Indianapolis, IN 317/257-4261
Kalamazoo, MI 616/381-1153
Lancaster, PA 717/295-1000
Lansing, MI 517/483-1153
Lexington, KY 800/269-8865
Little Rock, AR 501/661-1050
Los Angeles, CA 213/690-1313
Louisville, KY 502/456-4330
Memphis, TN 901/321-1000
Miami (Coral Gables), FL 305/448-1000
Miami, FL 305/575-5260
Milwaukee, WI 414/273-4430
Milwaukee-North, WI 414/961-2050
New Brunswick, NJ 201/247-2300
Omaha, NE 402/397-8115
Phoenix-South, PA 412/268-1000
Richmond, VA 804/265-2071
Rochester, NY 716/235-1000
San Francisco, CA 415/362-9911
Scottsdale, AZ 602/941-1515
Seattle, WA 206/767-7563
Seattle-North, WA 206/522-1111
Seattle-Denver, MI 313/689-2628
Syracuse, NY 315/471-7181
Topeka, KS 913/233-6419
Troy (Detroit), MI 313/565-4200
Tulsa, OK 918/622-0602
Wichita, KS 316/651-3330
Youngstown, OH 216/789-0017

COMPU SEARCH
DIVISION OF MANAGEMENT RECRUITERS

PROGRAMMER

Design and program micro-computer software for specific applications. BS in EE or computer science required. Assembly language programming, data communication experience necessary. Submit resume by December 21, 1979 to: Mike Stephenson, UMC 37, Utah State University, Logan, Utah 84322. An equal opportunity/affirmative action employer.

PROGRAMMER

Progressive firm in the Wheeling area seeking COBOL programmer to implement financial systems. Must be experienced with results oriented. All replies confidential.

Resume to
CW Box 2145
375 Cochituate Rd.
Framingham, MA 01701

SR. PROGRAMMER/ANALYST

Business/Financial Division

Consider this opportunity with EPRI on the SAN FRANCISCO PENINSULA, a non-profit R&D organization created to develop and coordinate a nationwide energy program.

Your primary responsibility will focus on the planning and development of potential business/financial EDP applications. You will also develop and debug program codes, conduct EDP cost analysis and train staff in the use and operation of systems.

Your Bachelors degree or equiv and 5 years experience with specific emphasis in business/financial programming and development required. Prior experience in VM/CMS or VPC/SS and an advanced degree in operations research/computer science is highly desirable.

We offer meaningful involvement, competitive compensation and excellent benefits. If you have the requisite background, send resume plus salary history and requirements to:

EPRI

ELECTRIC POWER RESEARCH INSTITUTE

P.O. BOX 10412
3412 HILLVIEW AVENUE
PALO ALTO, CA 94304
415/855-2367

We are committed to equal employment opportunities m/f/h.

frank
leonard
personnel

FLORIDA CAREERS IN THE SUNSHINE

LARGE, MODERN, TECHNICALLY SOPHISTICATED CLIENTS located in the SUNSHINE STATE have requirements for PROGRAMMER ANALYSTS, SYSTEMS ANALYSTS and DATA BASE SPECIALISTS who have experience in ANY of the following AREAS: IBM, CICS, IMS, COBOL, or ASSEMBLY LANGUAGE. Please submit RESUME including SALARY HISTORY or CALL:

FRANK LEONARD PERSONNEL

1211 N. Westshore Blvd., Suite 100
Tampa, Florida 33607
(813) 872-1853

ROBERT HALF

PACIFIC NORTHWEST REGION
Washington, Oregon, Idaho & Alaska

A great place to visit - a better place to live.
Managers
Auditors
Analysts
Programmers
Visiting here? Call collect, send resume or drop in to talk over current job openings and set up interviews for you.

Ray Magill, CDP

ROBERT HALF
of Seattle, Inc.
1301 - 5th Avenue
Suite 2828
Seattle, Wash. 98101
(206) 621-0000

SYSTEMS ANALYST (2) INTERNAL CONSULTANT SUNBET TO \$28,000

Exceptionally attractive opportunity exists with newly formed Latin American division of a major national corporation. Job starts as internal computer consultant. Position requires BS, plus MBA or MS or equivalent experience suitable for DD consulting with one of the world's leading corporations. Requires 3-10 yrs systems and programming in the financial and insurance industry. Must have strong communication skills and ability to deal with financial managers. Highly desirable S. Florida location w/15%-30% TRAVEL THROUGHOUT THE CARIBBEAN AND LATIN AMERICA. Starting salary to \$28,000, plus corporate benefits program and high visibility to top management of this division.

Reply in strict confidence to Steve Burns
(415) 951-6300, FOX-MORRIS Personnel
Consultants, 1590 Chestnut St., Phila., PA
19122.

POSITION WANTED

Dial an ADP Instructor

Professional DP classes/Workshop given in your classroom.

ANS Cobol, OS/DOS core dumps, OS/DOS JCL, Intro. DP. Also will contract to do hardware study or software automation. Write to: C. Newsome, Rt. 3, Box 885, Fredericksburg, Va. 22401 or phone 703-898-3270.

LIVE WORK & PLAY IN

NEW HAMPSHIRE SOFTWARE SPECIALISTS PROGRAMMER ANALYSTS

Several Software Specialists and Programmers Analysts head this month's list of critical openings. All are located in New Hampshire and have salaries in the \$18-24,000 range. For more information on potential opportunities, send a resume to David J. Osgood, CEC.

ability

160 South River Road, Bedford, NH 03192
(603) 669-4440
Personnel Consultants — An
Exclusively Employer Paid
Service

position announcements				
------------------------	------------------------	------------------------	------------------------	------------------------

MINICOMPUTER SOFTWARE PROGRAMMERS

EXPANDING DISTRIBUTED PROCESSING NETWORK

Champion manages millions of acres of forests, produces and distributes building materials, business paper and packaging. Our MIS department is a technology leader in developing a nationwide distributed processing network using IBM Series/1.

We are seeking minicomputer software programmers with a minimum of 2 years experience in assembler programming. We prefer a Computer Science Degree but will consider other disciplines or equivalent experience. Your initial involvement will be on Champion's Distributed Processing Systems on the IBM Series/1.

Champion offers competitive salaries and exceptional benefits in a professional and informal atmosphere in its largest administrative complex. We invite you to explore this opportunity by sending your resume in confidence to D.M. Yamasaki, Personnel Manager, Champion International Corporation, Knightsbridge Drive, Hamilton, Ohio 45020

Champion International Corporation

We take affirmative action toward equal opportunity employment.

Why move to FLORIDA?

If you can't answer that by looking out of your window, then also remember that Florida has the lowest cost of living of any major state with a rapidly growing demand for professionals in the computer sciences.

Here are just a few of the many and diverse requirements of our clients.

Manufacturing Systems	To \$35,000
IMS, Other Data Base Specialists	To \$35,000
Tech Support, Software Programmers	To \$30,000
Real Time Assembly Language Programmers	To \$30,000
Communication Analysts, Programmers	To \$30,000
Financial Systems Analyst, General Ledger	To \$30,000
Banking, Financial Programmers, Analysts	To \$28,000

For more information, send a resume or call collect:

Louis Reznick
Data Sciences Personnel, Inc.
P.O. Box 8577, Hollywood, Florida 33024
(305) 434-6112

DATA SCIENCES PERSONNEL, INC.
A MEMBER OF NATIONAL COMPUTER ASSOCIATES



DATA PROCESSING (PROGRAMMING) ADVISERS FOR OVERSEAS POSITIONS WITH THE U.S. BUREAU OF THE CENSUS DEPARTMENT OF COMMERCE

The Bureau of the Census is seeking well qualified data processing personnel with programming experience to be members of a team of technical advisors working with various users of the National Computer Center, Central Department of Statistics, Ministry of Finance and National Economy, Riyadh, Saudi Arabia.

The National Computer Center houses an IBM 370/158 (4 meg) with teleprocessing and data base management. Agencies using the National Computer Center facilities require technical help on initiating and managing a variety of automated systems, including economic, demographic, and management applications. Some systems are on-line.

Applicants for these 24-month assignments should have a thorough background in data processing and be capable of working with technicians from other countries. Experience in the following areas are important: COBOL and assembly language programming, OS/VS, MVS, CICS, TSO, VSAM, and IBM 360/370 computers.

Base salary ranges from \$20K to \$30K, depending on qualifications and experience, supplemented with a 20 percent differential and other allowances. Furnished housing and local transportation provided. Family to accompany. This is a Federal Government position, but is not in the career civil service.

Send resume or U.S. Civil Service Commission Standard Form 171 to:

U.S. Bureau of the Census
Personnel Division, Room 3245-3
Washington, DC 20233
Attention: Phyllis Green

Or call: Carl Gray (301) 763-2838 for further information.
An Equal Opportunity Employer

SYSTEMS PROGRAMMER/ TECHNICAL SUPPORT SPECIALIST

Bristol, a major high technology division of a Fortune 500 company, has this position available at Division Headquarters in Waterbury.

The successful candidate will be responsible for systems programming and for the evaluation of software & hardware in order to upgrade our present System 370 installation (DOS-VS). Immediate projects anticipated include the implementation of on-line programming and expansion of multi-programming capabilities. Subsequently, you will lead the conversion effort to an IBM 4300 and DOS/VSE in an extended control program mode. Some application programming will be involved.

This is a highly visible position with potential growth to Programming Supervisor. As the technical strong person of the installation, you will be advising and directly reporting to the Manager of Data Processing.

A strong COBOL background (preferably structured) is required as you will technically train applications programmers, establish programming standards, etc. A minimum of Associate's degree or equivalent in a related area is preferred.

We offer an excellent salary and complete benefits program. If you seek a rewarding challenge, CALL COLLECT (203) 575-3083 or send your resume and salary history in confidence to:

R. PIDUS, Manager of Professional Development

BRISTOL
instruments/systems

Bristol Division
Acco Industries Inc.

40 BRISTOL STREET
WATERBURY, CT. 06708

An Equal Opportunity Employer (M/F/H)

NEW ORLEANS POSITIONS

X13-30.000

Come live in the South's most interesting city. Programmers, Managers, and Analysts are needed. If you are a Data Processing professional with a desire to live in New Orleans, I would like to make you aware of the many fine positions available here. All fees, interviewing and relocation expenses paid. Come work and play in the South. Call or write in confidence:

Joe Holard (504) 837-8722

Data Processing Specialist

Professional Staffing, Inc.

POST OFFICE BOX 8715
METAIRIE, LOUISIANA 70011

Programming career opportunity:

Bar Harbor, Maine

Our 50-year-old, world-famous laboratory performs cancer research and produces laboratory mice.

We have a current need for an applications programmer for science and research, with at least 1 year of experience and understanding of biology and statistics.

You should have a degree in Computer Science or Biology, and a working knowledge of FORTRAN and/or PL-1.

You'll enjoy good salary and benefits and a marvelous coastal location in the midst of year-round resort activities...plus long-term career growth possibilities.

To apply, please contact:
Joanne Harris, Personnel Specialist, The Jackson Laboratory, Bar Harbor, ME 04609. Telephone: (207) 288-3371.

The Jackson Laboratory
Equal opportunity employer

SR. PROGRAMMER ANALYST

Switchcraft, a Raytheon Company, is a major manufacturer of electronic components used in a wide variety of industries. We are presently looking for a Programmer/Analyst to expand our computerized applications base for the forth-coming IBM 4300 Series and to expand our experience in general business applications and familiarity with COBOL and CICS under DOS/VSE is essential to this position. Some knowledge of BAL, RPG and DBOMP would be a definite plus.

If you can work with very little direct supervision and can appreciate the value of a very competitive starting salary, comprehensive benefits package and a truly congenial work atmosphere, we'd like to hear from you today! Send resume or call:

LOUISE MIELKE at (312) 792-2700



SWITCHCRAFT
5555 N. Elston Avenue
Chicago, IL 60630

An Equal Opportunity Employer M/F

DATA PROCESSING/ DATA BASE MANAGEMENT

A growing regional office of an environmental and energy research and development firm has a position available for an experienced programmer to assume responsibility for data processing and data base management work. Excellent potential for growth. Candidate must have 3 years experience and familiarity with various software packages such as SAS and System 2000.

Send resume, including salary history, in confidence to:

RADIAN CORPORATION

7000 Research Center
Suite 600, Lansdowne Bldg.
McLean, VA 22102

An Equal Opportunity Employer

Female/Minority

SALINA, KANSAS

Systems Software Programmer

This individual will be responsible for the generation and maintenance of our operating systems software. We are processing on an IBM 4310 under DOS/VSE. Near term plans are to install DOS/VSE, POWER/RJE, ICCF, and VAME. Send resume and salary history to ATTENTION: Mike Beatty, P.O. Box 1179, Salina, Kansas 67401.

A
classified
section
is known
by the
companies
it keeps.



COMPUTERWORLD

buy sell swap

IBM Processors**4331**Limited machines,
1st Qtr 1980**3135**Immediate delivery,
Sale or Lease**3138**Systems available,
Sale or Lease**3145**All configurations,
Available Now**3148**1 Meg System,
Now**4341**Try a 370/155 or
370/158 instead**3155**Immediate delivery —
w/DAT**3158**Most configurations,
Sale or Lease**3165**With DAT,
machines available now**3168**Machines available,
Sale or Lease**3031**2 Meg available
1st Qtr 1980**3032**System for
Lease — 6 Meg
December**3033**

Lease Financing Available

4704 Megs Amdahl
Memory &
4 Channel Group
Available Now**Memory**145, 148, 155
158, 165, 168, 303X
IBM & OEM
Memory Available
Call Rosemary Geisler
312/698-3000**2880-2**Channels Available
Sale or Lease**IBM Peripherals****3330/40**Immediate Delivery
For Your 4331**3350**

- Wanted to Purchase
- Limited Supply Available

3420All Models Available
Flexible Terms**3880**Control Units
Limited Availability
Lease Only**IBM Etc. .****3704/5**3704-A1, 3705-E1
Machines Immediately Available. Call
Karen Johns
312/698-3000**327X**Terminals, Printers & Controllers
Call
John Christopher
312/698-3000**3203-5**Printers Available
Lease Only
Limited Availability**Features**Many Features Available
from Inventory

Member CDA/CLA

**FOR SALE OR LEASE
370/155 II, J****Features:**1433 Third Block MUX Channel
3700 Double Precision Floating Pt.
3215 Console

3950 1401-1460 Compatibility

7117 7070 Compatibility

**Memory:
Available:
Contact:**

AMS 2 MEG With Processor Speed-up

Immediately

CURTIS A. HEYERDAHL

American Family Mutual Insurance Co.

Post Office Box 7430

Madison, Wisconsin 53783

Telephone:

(608) 249-2111

GMI
AMERICA'S
LEADING SPECIALIST
SERVING THE USED MARKET**System/34**

- All models including 128MB Disk (E35)
- Systems available with
- Remote displays — 5260 retail systems
- 4-13 WEEKS DELIVERY — NEW FROM IBM.

Not ready yet? Place your name and the word "Newsletter" on your business letterhead to join the thousands who receive our informative newsletters.

**DATALEASE
CORPORATION**

The IBM small systems financing specialists.

P.O. Box 467, Westport, CT 06880 • (203) 226-9582
2222 Diamond Hill Rd., Cumberland, RI 02864 • (401) 333-0240
4350 Georgetown Sq., Atlanta, GA 30338 • (404) 455-1480

TO SUBLICENSE
370/148 J (1 Meg)

Term, July-August, 1980 through
February, 1983. Earlier delivery
possible and negotiable. Features
include 2150 (Control Storage
Extension), 4660 (Integrated
Storage Control), and 6111
(Register Expansion). We are a
using, not a leasing company.

CW Box 2134
787 Washington St.
Newton, Ma. 02160

4341 1MB
AVAILABLE MARCH 1980
LEASE ONLY

Contact
DONALD LASSOFF
**ALANTHUS COMPUTER
CORPORATION**
203-226-7501
315 Post Road West
Westport, CT 06880

For Sale or Sublease192K NCR Century 151
Multiprogramming

6 Spindles 657

29 MB per Spindle

640 Printer

1200 LPM

GENERAL TRADING COMPANYSt. Paul, Mn.
Contact Ken Detle
612-645-6681**370/125**

512K System — all or part

Available 12/15/79

3340A2/B2's

3410/11 DD

1403 — 2501 — 1442

VERY REASONABLE

LEASE 4/36 MONTHS

SYSCOMPJim McCullough
(612) 474-8873**For Lease****IBM 4341-L**

Available May 1980

IBM 3031 — New

Available Dec./Jan.

Contact:

Bob Kendall

Leasing Dynamics, Inc.

1717 East 9th St.

Cleveland, Ohio 44114
(216) 687-0100

buy sell swap

CMI**AMERICA'S
LEADING SPECIALIST
SERVING THE USED MARKET!****303X**
New and Used Sale or Lease
3033-N8
1st Quarter '80 Availability**3138**
Short Term Leases
Available Now
Pam Hoban**SYSTEM 34**
All Models,
Upgrades and
Peripherals
Available Now!
Lloyd Marks**3168**
3 Available
Now Thru Jan/Feb**3145 3135**
Bob Southwell**3277 3278**
Printers/Controllers
Terminals
3741 and 3742
Unit Record
Kay Richard**3125 3115****3158**
Several
Configurations
Sale or Lease
Bill Graham**IBM Plug
Compatible**
CDC Omega
ITEL
Don Dupuis**360 CPU's**
1130-2020
2030 2040 2050 2065
and I/O
Joe Romeo**3155**
Model 3 w/DAT
IBM or OEM Memory
30 Day Delivery
Dave Shellenberger**4331 4341**
Your Position or Ours
Call Now For
Our Lease Plan
4331—Bob Southwell
4341—Don Dupuis**3880**
Sale or Lease
Limited Quantities
Also: 3370's, 3203's
and all other 3xx's
Pat Callahan/Patti Lamia**3148**
2 MEG
Short Term Lease
Will Reconfigure
Pam Hoban**SYSTEM 3**
Models
12 & 15
Denny Pennington**I/O**
Available
251A Switching Unit (4x 8)
3201 Card Reader
1442-412 Card Reader/Power
Joe Romeo**Call 1-800-521-9648****CMI** CORPORATIONSince 1969
755 W. Big Beaver Rd., 19th Floor, Troy, Michigan 48084. (313) 362-1000
IN CANADA CALL:
Jacques Dagenais • Montreal, Que. • (514) 374-5920
Don Dupuis • Windsor, Ont. • (519) 258-8910
TWX 810-232-1667 Member CDA CLA

THANKS IBM
 YOUR 20% DISCOUNT IS
 WORTH UP TO 100% TO
 YOUR 303X CUSTOMERS.
 CUSTOMERS...
 DON'T MAKE A MISTAKE.
 LET US SHOW YOU THE
 GREATEST LEASING
 OPPORTUNITY TO DATE.
 CALL NOW!!!

\$170 MILLION ALLOCATED FOR 303X
 EQUIPMENT — UNBEATABLE DEALS!!!



**COMPUTER
CAPITAL
CORPORATION**

274 RIVERSIDE AVE., WESTPORT, CT. 06880
 (203) 226-8301

DEPOT REPAIR

For Perkin-Elmer/
 Interdata

7 day guarantee
 turnaround

Competitive Prices!

TASCO
 (214) 231-0995

FOR LEASE

4331 I
 Immediately available
FOR SALE
 Telex 6721 Printer System
 With 5416 Train
 1442 N2

FOR SALE OR LEASE
 155J with 2 MB of CMI Memories

WANT TO BUY OR LEASE
 2305-2 Second Position
 Feature 6982 for IBM 2050
 Call Marvin Haber
 Federal Data Corporation
 301-988-0800

FOR SALE

DISK HEADS

A. 2314
 B. 3330
 C. ALL Others

All Models
Disk Heads
Repaired

With Excellence
 and Speed

I/O MAGNETICS, INC.
 219B Apollo 11 Blvd.
 Melbourne, FL 32905
 (305) 725-8080

Before you buy or sell used computer
 equipment consult

COMPUTER PRICE GUIDE

"The Blue Book of Used Computers"

Quarterly publication contains current
 price information about used IBM
 computers and peripherals. Includes
 newsletter about current price trends
 and availabilities.

\$6 per issue — \$20 annual subscription

Computer Merchants Inc.
 75 South Greeley Avenue, Chappaqua, New York 10514
 Member Computer Dealers Association (914) 238-9831

3032-U6 FOR LEASE

FEATURES: 1850 Channel-to-Channel Adapter
 3850 Extended Channels
 9202 Extended Channel Group

INCLUDES: 3036 Console
 3027 Power-Coolant Distribution Unit

LEASE TERM: 4 years at \$35,000 per month

AVAILABLE: 30-45 days after receipt of order

CONTACT:
WILLIAM L. WINK OR JIM L. LEIB

**MCDONNELL DOUGLAS
AUTOMATION COMPANY**
 P.O. BOX 516, ST. LOUIS, MISSOURI 63166
 PHONE: (314) 232-4508

MCAUTO®

Offices in principal cities from coast to coast
 A division of **MCDONNELL DOUGLAS**

PDP-11 Equip. for Sale

PDP-11/40-BK
RK05J-AA, RK05-AA
RKG11-EA, RK06-EA
DL11-E, H980-DH
11/34-11/40-11/45 Core
RSTS/E 60 License
 Carl. R. Boehme & Assoc., Inc.
 408-727-2688

FOR SALE DEC 20 MB

RP02 Disk Drive
 With RPR11 Controller
 And 4 Disk Packs
 Under Continuous
 DEC Maintenance
 \$5,500

For Information Contact
William F. Dowling
 (415) 834-5500
 Oakland, CA
 Peralta Community College District

buy sell swap

**LEASE ONLY
AVAILABLE**
**Jan. 25
3033**
RANDOLPH
Computer Company
Division of The Bank of Boston
537 Steamboat Road
Greenwich, CT 06830
800-243-5307
(in Connecticut 203-820-1200)
Member
Computer Leasers Association

**BUY-SELL-LEASE
BROKERAGE**

Let the
"Nation's Largest Wholesale Dealer"
Buy, sell, lease, sub-lease, or be your
agent in placement of your pre-
owned IBM 360/370 System 3, or
other units.

COMPUTER INTERNAT'L LTD.
BEACH COMPUTER CORP.
CWC's Leasing Division

COMPUTER WHOLESALE CORP.
(504) 581-7741
Suite 507/508, First National
Bank of Commerce Building
New Orleans, LA 70112
Member Computer Dealers Assoc.

BUY • SELL • LEASE • TRADE
Systems
3/32/34/38
CALL FOR A QUOTE
(612) 333-6476

**NORTHERN
GROUP LTD. INC.**
2124 100 Center
Minneapolis, MN 55402
34 and 38
delivery
positions
available.

**DATA GENERAL
SPECIALISTS
FOR**
Surplus New & Used
Equipment & Systems
with full depot repair facilities.
CALL US
WE TAKE THE TIME.
— WE CARE —
JM Associates
601 W. Chapel Avenue — Cherry Hill, NJ
08002
609-663-1115

AVAILABLE
3145/HO 3/4 meg CDC
3 Chris. Word Buffer - Dec
3158/K ISC & Madrid
2 Yr Lease Jan
3420/4 Dec
3211/3811 Dec
Please Call: (312) 943-3770
Forsythe/McArthur Associates, Inc.
919 North Michigan Avenue
Chicago, Illinois 60611

**FOR SALE
DATA GENERAL**
CPU - Model 8335, Nova 2/4
Diablo Disk Drive - Series 30
Terminal - digital Decwriter
II, LA36
Contact Ron Hoover
313/496-6808
Detroit, Mich.

GREYHOUND...
**wherever you need us,
we are there.**

Greyhound Computer Corporation has offices in a dozen U.S. cities and at six international locations to bring our computer leasing equipment, experience, people and resources direct to you. Call us for all your computer leasing needs today.

UNITED STATES

Arlington	.....	(703) 521-0300
Atlanta	.....	(404) 768-6535
Austin	.....	(512) 451-0121
Boston	.....	(617) 272-8110
Chicago	.....	(312) 298-3910
Dallas	.....	(214) 233-1818
Detroit	.....	(313) 961-1675
Houston	.....	(713) 447-0325
Los Angeles	.....	(213) 670-7994
Minneapolis	.....	(612) 370-1153
New York	.....	(212) 832-2622
Philadelphia	.....	(215) 293-0546
Pittsburgh	.....	(412) 922-8920
St. Louis	.....	(314) 353-8285
San Francisco	.....	(415) 283-8980

INTERNATIONAL

Dallas	.....	Greyhound Computer Overseas Corporation..... (214) 233-1818
Geneva	.....	22-61-27-54
Paris	.....	1-723-41-30
West Germany	.....	89-85-10-59
Mexico	.....	(905) 543-6850

CANADA

Toronto	.....	(416) 368-1513
Montreal	.....	(514) 281-1925

GMII
AMERICA'S
LEADING SPECIALIST
SERVING THE USED MARKET

3115 HG2

WANTED
3340-A2
3203-2
3411-3
January Delivery
Bob Southwell

Call 1-800-521-9648
GMII CORPORATION
(313) 362-1000

**NOW
NEW & USED
SYSTEM 3, 32, 38**

WE
PAY CASH
FOR SYSTEM 34
DELIVERY POSITIONS

CASE
Computer Services

1442 IRVINE BLVD., SUITE 128
TUSTIN, CA 92680 • (714) 731-6911

158-K
FOR SHORT TERM
SUBLEASE

AVAILABLE JANUARY

Commonwealth Computer Advisors, Inc.
707 East Main Street
Richmond, Virginia 23218

Call: Hal Gosnell
804-543-4200

**GREYHOUND
COMPUTER CORPORATION**
800-528-6113
Greyhound Tower, Phoenix, Arizona 85077

**XEROX
USERS**

WE
BUY - SELL - REPAIR
• COMPUTER SYSTEMS
• PERIPHERALS
• SUBASSEMBLIES AND
SPARE PARTS
Call toll free
800-423-5321 Ext. 14 or 15
in California
213-889-6031 Ext. 14 or 15

TYMSHARE
Equipment Support Division

**WHEN YOU NEED
DEC...****TERMINALS**

- VT-100
- LA36
- LA120
- LA180

**PDP11/03
SYSTEMS****LSI/11
MODULES**

Demand... Delivery
Demand... Discounts
Demand... UNITRONIX

UNITRONIX
CORPORATION
(201) 874-8500

198 Route 206
Somerville, NJ 08876
TELEX 833184

**SOURCE
DATA PRODUCTS**

34
SYSTEM



SPEEDY DELIVERY

BOB LOSEY

(408) 688-0941

WANTED!

ALL

NCR
MINICOMPUTER
EQUIPMENT

250, 299, 399, 499, 775
7200, 7750 & 8200s

SMITH ANDERSON CORP.
68-757 SUMMIT DR.
CATHEDRAL CITY, CA 92234
(714) 346-3227

**BUY SELL LEASE
or
TRADE**

DEC Computer Systems
and Peripherals

**SOUTHWEST
AUTOMATION CORP.**

14760 Memorial Drive
Suite 104
Houston, Texas 77079
713-496-4391

**FOR SALE
IBM System 34
Mod C23 64K**

5211 Printer Mod 002 and 5810
attachment. Three 5251 Display
Stations Mod 011 Cable Thru.
Under IBM Maintenance Agree-
ment.

Available Late Dec./79
PHONE:
305-573-8511, Ext. 224

FOR SALE OR LEASE
3741S
3742S
ANY CONFIGURATION
30 to 45 day availability!

METROPLEX COMPUTER COMPANY, INC.
7120 John Carpenter Freeway
P. O. Box 67230, Dallas, Texas 75247
(214) 634-2750
TWX: 910-861-4171

**IBM 370/4300
PERIPHERALS**
New 3203-5 Printers
New 3880-1 Controllers
Available Dec. '79

COMPULEASE, INC.
P.O. Box 160 • Dover, MA 02030
(617) 785-1107

**BUY-SELL
DEC 10**

**KA-KI-KL
SYSTEMS**
Call 617-261-1100
**AMERICAN
USED COMPUTER**

buy sell swap

About the IBM Price Cut...

Comdisco now offers substantial lease savings for your installed or on-order 303X Processor. Flexible lease terms to meet your equipment objectives.

We have financed over \$500 million in IBM Computer Equipment.

Call your nearest office or:

Comdisco, Inc.
9701 W. Higgins Road
Rosemont, IL 60018
(312) 698-3000



100 WANTED 100

BURROUGHS □ **N.C.R.**
12000-13000-14000-15000 270-775-299-31-32-33
16000-18000-19000-TC500 36-41-42-152-775
TC3500-TC3600-F5000 8200
B700 - B80 - B1700 - PERIPHERALS

WILLIAM MARION COMPANY, INC.
P.O. BOX 309, HACKENSACK, N.J. 07602
CALL (201) 343-4554

DEC Systems/Components

SYSTEMS/PROCESSORS: PDP8, 11/05, 11/15, 11/45, 11/60, KA-10, K110, PDP-15, 2020, 2040, 2050

MEMORY: MF11UP, MM11L, MM11DP, MM11US, MA10, MB10, MD10, ME10, MF10, MG10, MA20, MB20

COMMUNICATIONS: DC11DA, DC11A, DC10A, DC10B, DC10E, DC10F, DN67, DS10

DISK EO: RP02, RP03, RP04, DM323, RF/RS11, RC10, RH10, RM10B, RD10, RS04, RK11DE

MAGTAPE: TU10, TU20, TU30, TU40, TU45, TU55, TM02, TM11

PAPERTAPE: PC05, PC08, PC11

EXPANSION CHASIS: BA11KE

PRINTERS: LP07, 1403N1 (Grumman Controller), LP100, BA10

COMPONENTS: DA11F, DD11DK, KT11D, KE11E, KJ11A, MX10, DT03, DT05

MISCELLANEOUS: HP 2888 Disk Drives CD12 Disk Drives H312A Null Modem Calcomp 563 plotter Power supplies Modules, Hundreds of Hundreds of

COMPUCOM INC.

3402 Oakcliff Rd. B-7
Atlanta, Georgia 30340
404-452-1090

SALE OR LEASE

SYSTEM/34

- E35's
- Many Models
- 30 Day Avail



SYSTEM/3

All Models

- MODEL 15
- Model 8, 10, 12
- SYSTEM/32

We Need To
BUY
Your Sys/3

SYSTEM/3

- 3340, 44
- 3411, 10
- 3741, 42
- 3277

IBM 3300-1 Qty 3

IBM 3830-1 Qty 1

With 2 Channel Switch

Available January

Diebold Computer

Leasing, Inc.

(201) 569-3838

3031's

3033's

Available

December, 1979

New from IBM

Call: Hal Goenell

804 843-4200

Commonwealth Computer Advisors, Inc.

707 East Main Street

Richmond, Virginia 23219

COMPUTERWORLD

buy sell swap

buy sell swap

buy sell swap

buy sell swap



BUY • SELL • LEASE

370/115

370/125

Call Ken Bouldin
or John Ferguson

370/135

370/138

Call Mike Nelson

370

145/148

Call Verlyn Sims

S/3

MODEL 8

MODEL 10

MODEL 12

Call Roger Odom

IBM Maintenance Guaranteed

S/3-15

Call Jack Goodman

IBM Maintenance Guaranteed

S/32

3741 • 3742

Call Gayle Drotar

IBM Maintenance Guaranteed

S/34

Call Roger Odom

IBM Maintenance Guaranteed

TAPE

DISK

3411 3340

3410 3344

3420 3350

Call Bob Ford



IBM Unit Record Equipment

Mod	Sale	Lease	Specials	Mod	Sale	Lease
026	\$ 750	\$30/mo	087	\$2100	\$1200	\$60/mo
029	\$1750	\$50/mo	1403(2)	\$3900	888	\$2250
082	\$ 750	\$30/mo	2203(1A)	\$1500	129	\$3200
083	\$1700	\$60/mo	2020(C1)	\$1500	548	\$1500
084	\$2500	\$90/mo	3348-35	\$ 550	557	\$3100

Other Machines Also Available

Disk Packs, Cartridges, Modules

3335-11	\$249.00	2316's	\$99.00	DATA MOD'S	\$899.00
3336-1	\$149.00	1316's	\$89.00	CARTRIDGES	\$39.00

We Purchase Used Packs & Modules



New Memorex Mag Tape from \$6.99 ea.
100% Recert Mag Tape from \$4.99 ea.
Memorex Diskettes & Non IBM Packs in Stock.

Thomas Computer Corporation
600 North McClurg Court Chicago, IL 60611 (312) 944-1401

IDS international data services, inc.



415 969-7222
telex 345 592

453-D Ravendale Drive
Mountain View, Ca. 94043

AVAILABLE IMMEDIATELY

370/155J or K - Undated

370/155J or K - Dated

370/155 Memory (IBM-AMS-CMI-Ampex)

Please contact:
Harry E. Blair 713-524-8249



FOR SALE

- 370/135 IBM Memory
- 370/135 OEM Memory
- 370/135 Features
- 3215-1 Console
- 3046-1 Power Unit

Bob Frank

(415) 254-2638

FOR IMMEDIATE SALE

- 3803-2 w Features Qty 2
- 3803-1 w Features Qty 1
- 3420-8 Dual Density Qty 6
- 3420-7 Dual, 7 Track Qty 6
- 3271-2 With 3250 Qty 1
- Excellent Prices
- Esna Ltd.
- Phone 416-495-9392
- Telex 06-866623

Short Term and Long Term Lease Plans Available

O.P.M. LEASING SERVICES, INC.

*The Custom
Leasing People*

Branch Offices

ATLANTA	(404) 953-0928
BOSTON	(617) 933-8451
CHICAGO	(312) 945-8150
DENVER	(303) 499-4488
DETROIT	(313) 996-5811
HOUSTON	(713) 367-1668
LOS ANGELES	(213) 278-4117
MINNEAPOLIS	(612) 884-9980
NEW JERSEY	(201) 635-1092
N.Y. FINANCIAL DISTRICT	(212) 747-0220
ST. LOUIS	(314) 434-6330
SAN FRANCISCO	(415) 383-4111
WASHINGTON, D.C.	(202) 656-8676
International Offices	
LONDON	01-222-4031
PARIS	(Contact London Office)
COLOGNE, GERMANY	(Contact London Office)



Corporate Headquarters

O.P.M. LEASING SERVICES, INC.
71 BROADWAY, NEW YORK, N.Y. 10006
(212) 747-0220 (800) 221-2674

YES!

AMERICAN COMPUTER GROUP

SYSTEM/32
& SERIES/1

NOW!
SYSTEM
34
Call (617) 261-1100
P.O. BOX 68, BOSTON, MA. 02215

SYSTEM/3
Models 12 & 15

FOR SALE OR TRADE

EDP SYSTEM 380-0-20

CONSISTING OF:
One IBM 2020 Central Processing Unit, Model BC1, 12K — #1580 Card Print Control, #8053 2203 Attachment — 144 Print Positions, #8094 2501 Attachment — #8099 2560 Attachment, #8095 3801 Regular Color Camera, #9905 230 V AC 3 PH 60 CY, One IBM 2203 Line Printer, Model A01 Printer, #1902 39 Character Set, #5558 24 Add'l Print Positions, #9041 Regular Color Acoustic Red, #9056 52 Character Set, #9733 Type Size .095 and #9905 230 V AC 3HP, 6CY.

Will Consider:

Trading the above system for two IBM 407 tabulating machines, providing that they are in good working order.

IBM 024 Keypunch's

Fifteen Keypunch's, All in Excellent Working Condition, Selling for \$75.00 each.

Call or Write, P.D. Moncada Company, 111 Highway 16, West Sacramento, CA. 95891. Telephone — (916) 371-1220.

WE BUY, SELL, LEASE, TRADE

ALL BRANDS & MODELS OF:

• PRINTERS • CRTS • MODEMS
• MINICOMPUTERS • PERIPHERALS
AND ALL OTHER
DATA PROCESSING EQUIPMENT.

Nearly \$1 Million in Inventory

Phone for Price Quotes

214/357-5725

KALBRO computer brokers

Formerly U.S. Brokers Co., A Division of Kalbro Corp.

2636 WALNUT HILL LANE, SUITE 347, DALLAS, TEXAS 75229

4331-J

Avail: August, 1980

Contact: Bob Miller

CENTRON — DPL
(612) 884-3366

TO SELL OR LEASE
20 MEMOREX 1377
(Model 4) CRT's

IBM 3277 look-alike CRT's to sell or lease. Also available, IBM 3272 control unit. Would prefer to sell all CRT's and control unit at once. We are a using, not a leasing company.

CW Box 2133
797 Washington St.
Newton, Ma. 02160

THIS
SPACE
FOR
HIRE.

[Inquire at Classified
Advertising Dept.]

buy sell swap

IPS

YOUR BEST DEAL
ON PRE-OWNED
IBM SYSTEMS & COMPONENTS

We're Buying
3033
3032
3031
Rental Credits

Sale/Lease
3168 L
Available January

3148 K
1 Year Lease
February 1980

3138 J
1 Year Lease
January 1980

3158 Memory
3145 Memory
Available Now

We're Buying
3350-A2/A2F
3350-B2/B2F
3350-C2F

New Jersey
201/262-9500Chicago
312/368-9627Atlanta
404/581-0885

IPS Computer Marketing Corp.
Mack Centre Drive, Paramus, NJ 07652,
201/262-9500, Telex 642197 IPS PARA.

NCR USERS YEAR-END SAVINGS SPECIAL PRICES ON INVENTORY ITEMS

657 Disk & Controller
626 Printer Controller
626 & 640 Printer PKG
Several 101 Configurations

656 Disk & Controller
636 Cassette Reader
8250 Complete System

Computer Connection Corp.
8210 Penn Ave. So., Minneapolis, MN 55431
(612) 884-0758

3272 3741
3277 3742
3286 129'S

SYSTEM 34
BUY - SELL - LEASE
JIM CARLETON

370/138
370/148
BUY - SELL - LEASE
JOHN MILLS

National Computer
Equipment Corp.
2516 Jefferson
St. Clair Shores, MI 48081
(313) 774-7400

Inflation Fighters

Quality & Savings

Slightly used, Money Back Guarantee.
Full Reels. All External Labels Removed.
Guaranteed for use at 600 BPI through

6250 BPI.
2400' Reel \$4.50 ea.
1200' Reel \$4.00 ea.
600' Reel \$3.25 ea.

All Tapes with Hanging Seals
We pay freight on orders over 200 tapes
All orders shipped within 48 hours

Call or Write
Computer Tape Mart
169 B New Highway
Amityville, New York 11701
(516) 842-8512

FOR SALE:

Quantor-NCR-115 32K
COM Recorder (New)
Bruning OP50-Microfiche
Duplicator
Factory Refurbished
Reasonably priced
Immediate availability
Call (305) 591-7695

PDP 11

300 Megabyte
Disk Drive Systems
Available
Immediately
Nordata
(206) 282-1170

NF COMPUTER SALES & LEASING CORP.

312/920-8181

3203-5**3211**

PRINTERS

Available Now
Sale or Lease**3880**Lease Only
Dec 79 Jan 80
Apr 80 Jun 80**3276****3278****3287**Available Now
Sale or Lease**3420-5**
TAPE DRIVE**3803-1**
CONTROLLERAvailable Now
Sale or Lease**3830-2/8170**
3333-1&11**3330-11**Available Jan 80
Sale or Lease**3277-1**
3277-2**3286-2**Available Now
Sale or Lease

1211 W 22nd Street Oak Brook, Illinois 60521

Member Computer Dealers Association

FOR SALE OR LEASE

STC Tape Drives
(8) 3670's Dual Density
STC Tape Controller (1) 3800-4
Maintenance guaranteed by STC
IBM 2914 Switching Devices
4 X 8 and 4 X 4

Jacom Computer Services, Inc.
169 South Main Street
New City, New York 10566
914 634-3630

System/34

Buy - Sell - Lease

- All models including 138.4 MB Disk
- Peripherals including 8250 Model 3's

(88) 8251-Model 12's with cluster
TexCom offers leases at prices less than IBM's. Take advantage of our program
using your order System/34 System/38, or one of ours.
TexCom will purchase System/34 delivery positions.

San Antonio, Texas

 TexCom

512-690-9826

IBM 4331 & 4341 WAITERS

Interim IBM system available until delivery of your
on order CPU

115 138**125 145****135 148**

We also will offer to purchase the system or components
you have outgrown.

 **CORPORATE COMPUTERS, INC.**
(203) 661-1500
115 Mason St., Greenwich, CT 06830
Member Computer Dealers Association

FOR SALE DEC EQUIPMENT

New DH11-AA and
2 New DM11-DA
and either
Used DM11-DB or New DM11-DC
New equipment in sealed carton.
Contact: Bruce L. Gaarder
(612) 647-6138 or -6171
Macalester College
1600 Grand Ave.
St. Paul, MN 55105

WANT TO BUY

Memory Expansion Cabinet and 256K Memory for
Burroughs B-1726 System

Contact: Steve Hill
High Point Anesthesia
P.O. Box 2444
High Point, N.C. 27261
(919) 882-2567

Immediately Available

NEW SERIES I

Model E 158K or 256K
4979 Display 4974 Printer
Model A Rack 5650
Programmer Console
4962 Disk (2) TTY
\$42,000
A. Palmer
(212) 439-1102

BURROUGHS L6500 ID# 65062

Available immediately for sale
Contact Mr. Beecher
Servitor, Inc.
407 N.E. 44 Street
Fort Lauderdale, Fla. 33344
(305) 772-8913

buy sell swap

BUY SELL LEASE**370 PERIPHERALS**Disk Printers
Tape I/O**370 CPU'S**135/145/155
138/148/158**880**
Sys. 32/34/38
All Sys. 3**DATA ENTRY**
37XX/5496
All 3200**UNIT RECORD**
029/129
083/557DAC Buys Rental Credit Equipment
Call or Write**DATA AUTOMATION CO., INC.**

4858 Cash Road

Dallas, Texas 75247

214 637-6570

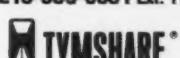
Member of Computer Dealer Association

Immediately Available**BURROUGHS B 80**26" 180 CPS Console
B9480-22 SH Disk 4.4 MB Self
Scan and Memory Extension 2
Interpreters CM80 MCP and
AC80 BCP (Emulates L Series)\$22,500
A. Palmer
(612) 439-1102**Available For Lease****370/138J**

Call Norm Berger

Corporate
Computers, Inc.
115 Mason Street
Greenwich, Conn. 06830
(203) 661-1500
Member Computer
Dealers Association**AMPEX USERS****WE BUY - SELL - REPAIR**

- DIGITAL TAPE DRIVES
- DISK DRIVES AND RELATED ASSEMBLIES

Call toll free
800-423-5321 Ext. 11
in California**213-889-6031** Ext. 11

Equipment Support Division

SHORT TERM LEASES**138's, /148's, /158's, /145's****3330's, 3350's, 3420's****360/40's, /50's, /65's****Call Us Collect****UNITED STATES**

Boston: Eastern Regional Headquarters (617) 272-8110
Arlington (703) 521-0300
New York (212) 832-2622
Philadelphia (215) 293-0546

Austin: Southern Regional Headquarters (512) 451-0121
Atlanta (404) 768-6535
Dallas (214) 233-1818
Houston (713) 447-0325

Chicago: Central Regional Headquarters (312) 298-3910
Pittsburgh (412) 922-8920
Detroit (313) 961-1675
Minneapolis (612) 370-1153
St. Louis (314) 353-8285

San Francisco: Western Regional Headquarters (415) 283-8980
Los Angeles (213) 670-7994

CANADA (416) 366-1513
Toronto

**GREYHOUND COMPUTER CORPORATION****800-528-6113**

Greyhound Tower Phoenix, Arizona 85077

**FOR SALE
IBM SYSTEM 7
COMPONENTS**6 - 5028 Operator Stations
36 - 5010 Memory Storage Cards
(For 5010 Model E)
Has been under IBM maintenance**MAKE OFFER**Contact: Larry Preston
CREDIT BUREAU
DATA CENTERS, INC.
2505 Fannin
Houston, Texas 77002
(713) 652-3739**IBM 4331
COMPUTER TIME**Firm Located
Sacramento, CA
Has Extra
Capacity Available
All Shifts
\$75.00 Per Hour
Call 916-452-8231
Ask For Mr. Delong**Wanted To Buy
ENTREX 280
SYSTEM
With 16 Stations**Pis forward offer to:
GARKO International
1538 EL Camino Real
Burlingame, California
Tlx. No: 0331312**WANT TO BUY
IMMEDIATELY****11/70
SYSTEM**
Call 617-261-2705**FOR SALE OR LEASE****3505 82 3525 P3**
5450, 6555 1421, 1533
8100, 8105 5273**AVAILABLE JANUARY**Paul Sheedy (312) 991-6262
**INTERSTATE COMPUTER
SALES AND LEASING INC.**

Need To
Buy
System/3
-15D

Owens Computer Group
(312) 448-4300

Lease/Purchase**4331 — J**
ship: January 18, 1980**I/O Available**
Bernie Gest
(215) 782-1010
COMPUTER
MARKETING, Inc.**Prime Computer
Plug Compatable**80-300 MB Storage Module
Drives
32-96 MB Cartridge Module
Drives
300-900 LPM Printers
Less Than 50% Of List
TIMESHARING
SERVICES, INC.
904-398-9455**For Sale
or Sub-Lease**

- Quantor 105/205 Microfiche Processor
- IBM 1419 MICR Reader/Sorter
- Telex Off-Line Print System
- 1 x 6 Calcomp 2319 Disk

All Inquiries to:
Bill Flaherty
914 694-8800, x417

12 Month Sub-Lease**3031**Available
January 1, 1980
Call Brad Miller
(415) 955-0387**Alanthus Computer Corporation****Alanthus is pleased to announce
a new lease program for 4341's.****Lease Term: 2 to 6 years****Lease Rate: 82% to 50% of IBM MRC****Call Your Local Alanthus Office Now For More Details**

ALANTHUS—often out-promised; seldom out-performed.

315 Post Road West
Westport, Connecticut
06880

Cleveland, OH	216-476-2970	Pittsburgh, PA	412-261-4193
New York City	212-867-0630	Los Angeles, Cal.	714-833-1762
Cherry Hill, N.J.	609-482-2880	Dallas, Texas	214-386-5417
Atlanta, Ga.	404-955-7438	Washington, D.C.	703-548-9065
Chicago, Ill.	312-843-7775	Westport, Conn.	203-226-7501
Minneapolis, Minn.	612-831-6224	St. Louis, Mo.	314-625-3400
Buffalo, N.Y.	716-842-0461	Boston, Mass.	617-749-7057

MPL
SILENCED
**FREQUENCY
CONVERTERS**
FOR
IBM 303X
AMDAHL

AND OTHER
400 Hz COMPUTERS

MPL COMPUTER POWER SYSTEMS
BELVEDERE WORKS
BILTON WAY
HAYES MIDDX ENGLAND
TEL 01-848-9871 TELEX 934110
3206 LANVALE AVENUE
RICHMOND
VIRGINIA 23261
TEL 804-355-2803 TELEX 828348

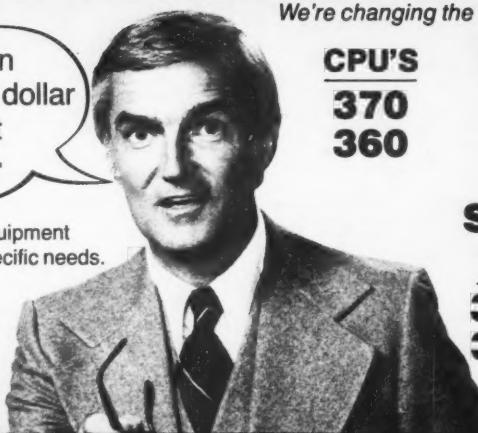
buy sell swap

dataserv COMPUTER MARKET PLACE

"Get the best return from every computer dollar you invest, contact **dataserv**

We specialize in providing equipment and terms tailored to your specific needs.

Ten years of experience and over 5000 IBM transactions are proof of our commitment to complete customer satisfaction."



ATLANTA 404 523-6043
CHICAGO 312 951-6344
CLEVELAND 216 921-3960

DENVER 303 893-9648
DETROIT 313 961-6547
LOS ANGELES 213 626-0208
MINNEAPOLIS 612 544-0335

NEW YORK 212 926-6530
PHILADELPHIA 251 561-3964
SAN FRANCISCO 415 398-2002

We're changing the way companies buy, sell and lease IBM computers

CPU'S	GSD	DISK	PRINTERS
370	32	3330	1403
360	34	3340	3203/3211
	38	3344	DATA ENTRY
	Sys/3	3350	
	TAPE	MICR	3277
3410	1419	I/O	3741
3420	1255	3505/3525	
		ATM's	

Member Computer Dealers Association

OR CALL TOLL-FREE **dataserv headquarters**
800/328-2406

dataserv building
9901 Wayzata Boulevard
Minneapolis, MN 55426

• DATA GENERAL • • DEC • SURPLUS SPECIALS

4300, 4291, 4299 Data Acquisition
4234 Disk Controller
4241 ULM 5
8535 Map for Nova III
2 High Speed Paper Tape Readers
Core for Nova 1200
Eclipse 16 KW Core
SLA 4074
Nova 2 CPU & Memory
Nova 1200, 840 & Nova 2's
Linc Tape
Techtronic Hard Copy Printer
Graphics CRT Compucolor 400
EDS Mighty Mux 4 or 8 Line
Disk Packs.
DG 6012 & Infoton CRT
4060 4 Line Mux

RP04AA RH11 RHT0
TU 10
M 7850
DLV 11E
RK05 J RK05 F RK11D RK8E
MJ 11 BE
RPO2
RPO2
RPO3
DS 310
AODS 920
TU 45
TU56/TC11
11/03, 11/34, 11/40
11/45, 11/60 Systems
EDS Point 4 20% Discount
Entrex Systems.

BUYING OR SELLING, CALL:

• DEC - Bryan Eustace 305-272-2338
• DATA GENERAL - Phil Thomas 305-272-2339

Thomas Business Systems, Inc.

FOR SALE OR LEASE

135 H 4655, 4670, 4672,
6981, 7861, 7862,
3215, 3046
145 HO +768K CDC/
AMS, 3 ch. 3274,
8810, 7855, 3215
145 H2 4660, 2152,
6111, 6983, 2001,
8810, 7855, 3215,
3046
145 I2 6982, 4660,
2152, 6111, 2001,
8810, 3215, 3047
145 I2 6982, 4660,
2001, 8810, 3047,
3215
145 HG2 6982, 4660,
8810, 2152, 6111,
3047, 3215

168 Memory, 3 meg
NATL SEMI
2821-1, 2540, 1403-N1,
1403-N1
2-3803-1 dual density
(1792)
8-3420-3 dual density
(3550)
3811/3211 Printer &
Control with P11
trains available
155 J with DAT 3 ch,
7855, 3215
155 K 2 meg all IBM
with DAT, 1433,
1434, 1435, 5450,
7855, 3215

Tom Harris
Tommy Talbot
(415) 387-3888

Sale or Lease Immed. Avail.

• IBM 3420-6

TAPES & CONTROLLER w/ Dual Density

- Hi-Speed I/O Set
w/ UCS
- IBM System 32

Call George Gilman
Toll FREE Outside N.Y.
800-221-8438

IOA DATA CORP
383 Lafayette Street
New York 10003
(212) 673-9300

IBM S/34 For Sale

Communications available
Local and remote displays,
line printers,
matrix printers
Deliveries throughout 1980

Call Evelyn Liffiton
(617) 879-2503

Waters Business Systems, Inc.

FOR SALE

Honeywell 61/58 System
1-10K CPU
2-5.7 MB Disk Drives
(11.4 MB Total)
1-200 LPM Printer
1-200 CPM Card Reader
1-Multiline Controller
w/3 Async. Channels
2-ADDS 520 Terminals 24x80
1-ADMS 520 Terminal 24x80

All under Honeywell maintenance. Software
(A/R, A/P, G/L, Inventory Control & Invoicing)
Included.

\$29,000.00
DICK SAFIER
(216) 341-8600

MISSISSIPPI CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Building, Jackson, MS 39201, for the following data processing equipment and services:

Request for Proposal No. 521 due 3:30 P.M., Tuesday, January 8, 1980, for the acquisition of an upgrade to an existing Mark IV software package.

Request for Proposal No. 522 due 3:30 P.M., Tuesday, January 15, 1980, for the acquisition of a 20 station data entry system.

Request for Proposal No. 523 due 3:30 P.M., Wednesday, January 16, 1980, for the acquisition of a distributed processing system compatible with existing batch and online software written for an IBM 370/158 running under MVS.

Request for Proposal No. 524 due 3:30 P.M., Thursday, January 10, 1980, for the acquisition of Public Fund Accounting Software for a junior college which has an IBM System 34.

Request for Proposal No. 525 is for the acquisition of a hardware and software system to handle a centralized pharmacy system. A preliminary draft of the specifications is available. A bidder's conference to finalize the specifications for this system will be held at the CDPA office, 508 Robert E. Lee Building, Jackson, MS 39201, at 3:30 P.M., Thursday, December 20, 1979.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informality.

Malinda Algee, Central Data Processing Authority
(601) 961-4312

LEASING

System 3
3741 & 3742
029's

Model 10, 12 & 15
129's
System 34 & 38

vantage
Computer Marketing, Inc.
1915 Peters Rd., Ste. 207
Irving, TX 75061
(214) 438-8211
TWX 910-860-5060



Contact: Bernie Gert
(216) 782-1010

7704 Seminole Ave.
Mahwah Park, Pa. 19126

Computer
Marketing
Inc.

IMMEDIATE DELIVERY

3420 TAPE DRIVES
1419 MICR
3274-3276 & 3278's

WANTED

3350's A&B2

buy sell swap

LEASING

The innovative leader in the buy and sell market, PCM, now offers walk-away leases on IBM systems and peripherals.

Please call or write for rates and terms on all IBM equipment.

PCM Leasing

1165 Empire Central Place, Suite 232, Dallas, Texas 75247

214/630-6700

1616 Anderson Road, McLean, Virginia 22102

703/827-0237

C.P.U.'s SPECIAL

3135, 3145, 3158

3880's

3138, 3148, 3168

For Sale
Or Lease

DISK: 333X, 334X, 3350, 3830

TAPE: 3410, 3411, 3420, 3803

PRINTER: 3203-2, 4, 5, 3211/3811

CARD 1/0: 2501, 3505/3525

CRT: 3277-1, 3277-2

OTHER EQUIPMENT

2880 (02) 2040, 2050

2880 (01) 2420 (07)

ISC-3168/58 2803 (01)(2)

1/2 meg 158 memory 2415

Pioneer Computer Marketing
1165 Empire Central Place, Dallas, TX 75247

214/630-6700

CLE

Computer Equipment Specialist
For Sale

370/138/J

3274, 4655, 8075, 3046

Dec. 15

CLE CORPORATION
Phyllis Myers
(404) 394-9533

WE BUY 158 & 168 MEMORY

transdata
214/631-5647

FOR IMMEDIATE SALE IBM - 115 - 0 192K STORAGE

WITH:
3270 Type D.O.C.
3203-2 1200 LPM Printer
3900 - Floating Point
5248 - Byte MPX Channel
4675 - Mag. Tape Adapt.
4650 - 3203 Printer Adapt.
4653 - 3203 Printer Adapt.
Prereq.
9771 - 3203 Printer Adapt.
Prereq.
9080 - Below Floor Cables

Excellent Cond..
Maint. By IBM

Contact: Herb Parsons, DP MGR
Automatic Radio Mfg. Co., Inc.
Melrose, Mass.
(617) 321-2300

FOR SALE IBM SYSTEM 3 MODEL 10

5410-CPU (32K),
5424 MFCU
Two 5444 Disk Drives
Available May 1980
Best Offer
Contact Bob Houlihan
(201) 244-4596

4331

Available for Lease

12-21-79

Sun Data, Inc.

Call 1-800-241-9882
(404) 449-6116



PRIME 400's PRIME 650's

Substantial Discounts

SUPER LEASE RATES

Under Current Market
Immediate Availability
CONTACT

Technical Services Group Inc.
27 North Broad Street
Ridgewood, NJ 07450
(201) 444-7744

HIGH-QUALITY
ACCOUNTING AND
FINANCIAL REPORTING
SOFTWARE FOR
DEC AND PRIME
MINI-COMPUTERS.

- General ledger
- Payroll
- Professional time accounting
- Accounts payable
- Accounts receivable
- Data base management

III COMPUTING
Programmed Business Systems
718 Third St.

St. Paul, MN 55110
Contact: Tim Stormoen
Phone (612) 426-3235

MEMORY EXPERTS

Call Us First
For Your

360-370-303X
Memory Requirements

CENTRON — DPL
(612) 884-3366

FBH DATA PROCESSING

P.O. Box 29
D-8473 Freimdt
West Germany

FOR SALE (by owner)

Gental 1300 Computer System

Includes:
1300 Hi-Speed Processor
(64K Memory)
2 - 12MB Disc Drives
2 - 1728 Char. CRT's
1 - 300 LPM Printer
System is under manufacturer's
maintenance contract

Truck Line Software Available

Contact: Charles Anderson
Hill Truck Line, Inc.
P.O. Box 988, DTS
Omaha, NE 68101
(712) 328-2303

DATAPOINT TELEX

IBM

UNIVAC

DATAPOINT

BUY
SELL
LEASE
NEW & USED

↓

Hardware: 1100 1500 1800 w/wo Datashare
2200 5500 6600
300 L.P.M. PRINTERS — AVAIL — NOW — \$3850. Ea.

Software - Circulation Data Systems - Designed For:
Publishing & Mailing Industries
- Small Business Systems Applications

TELEX

Qty - 6420 Tapes - Mod - 3, 5 & 7 SD/DD
4x16 - 6420 Tapes - Mod - 66 - 6250 BPI - DD
1x4 - 6316-1 Disk Drives - Qty - 5312 Disks - SD & DD
Printers - 5403/5821 and Qty - 5848 - 1 & 2 Off-Line
Sys

IBM

Communications & Periph.

UNIVAC

1100 Series Systems & Periph.

THE AMERICAN COMPUTER & FINANCIAL CORP.

17 E. Orange St.

Chagrin Falls, Ohio 44022

(216) 247-3232

MEMBER



SALE/LEASE IBM Peripherals

TAPE: 3420 Models 3, 5, 7, 4, 6, 8

PRINTERS: 3203, 3211, 1403, 3287

DISK DRIVES: 3330, 3340, 3344, 3350

CONTROLLERS: 3803, 3811, 3830, 2821

CARD I/O: 3505, 3525 & 2540.

CRT: 3278, 3277, 3274, 3276

MICR: 1419 Single & Dual Address

1412 Off Line

IMMEDIATE DELIVERY!

HAMPTON BUSINESS MACHINES CO.

A Division of DP Service Inc.

5569 N. Elston Ave. Chicago, IL 60630

Call: 312-774-2556

NOW SYSTEM 32-34

BUY - SELL - LEASE

IBM 3741 - 3742

Keypunches - Computers - Peripherals

026 9790 081 91600 519 91000
026 3790 081 19800 567 31900

Tom Holland Bill Broden

buy sell swap	buy sell swap	buy sell swap	buy sell swap	buy sell swap
FOR SALE OR LEASE PDP 11/40-BK KE11-E, KT11-D 96KB Core RK11DJ-AA RK05J-AA DECwriter II Can Run UNIX V6 RSTS/E 6C, RSX11m V3.2 CARL R. BOEHME & ASSOCIATES, INC. Specialist in Digital Systems Engineering 408-727-2588	TIGER 415 Madison Ave. A TIGER INTERNATIONAL COMPANY  Purchase Lease Back 370/138,s 370/148,s and All peripherals	COMPUTER New York, N.Y. 10017 (212) 532-1500 Lease Short Term 370/148-K ISC/w MADRID Avail. mid Nov.	For Lease 370/168 Upgrades U-34 to U-36 U-36 to U-38	PDP-11/70 SYSTEM 1024KB Memory Two 300MB Disk Drives 125 inch-per-second Tape 16 Asynch Comm Lines AVAILABLE IMMEDIATELY \$189,900 Nerdta (206) 282-1170
Cash FOR YOUR PDP-11 (714) 739-2727		3033-U8 November, '79 for Lease		FOR SALE DEC 11/60 256KB MOS, 2-RK07 TJE16, DZ11A 2-VT100, 2-LS120 RSX11-M, FIVPLUS. 713-686-9405
WE BUY • SELL • LEASE S/3 MODEL 15/12/10 GSC Gen Systems Corp. 2146 Livernois Drury Professional Bldg. Troy, Michigan 48084 Phone: (313) 689-6200 Jerry Roberts Carole Solano		3032-U6 Lease Available Nov. '79		GMI AMERICA'S LEADING SPECIALIST SERVING THE USED MARKET! 34 C-23 & E-35's AVAILABLE NOW Lloyd Marks Call 1-800-521-9648 GMI CORPORATION (313) 362-1000
	370/145-I 3047-1 Avail. Dec. '79	370/168 for Lease Nov. '79	Sale or Lease 360/30 thru 360/65 Month to Month Leases Available	
	Buy/Sell/Lease 3350,s 3830-1,s 3340,s 3830-2,s 3344,s 3803-1,s 3330,s 3803-2,s All 3420 Tape Models	2880 M2 Block Multiplexer Available now for Lease	3270,s Sale or Lease	
COMPUTER BROKERS, INC. 2978 SHELBY STREET MEMPHIS, TENNESSEE 38134 AC 901 372-2622 MEMBER - CDA	<ul style="list-style-type: none"> SELL LEASE BUY RENT 	3,32,34		
FOR SALE One (1) - IBM 6430 Data Processing System <small>(3 pieces) operable as a unit or suitable for standby and parts. Packed for moving but uncrated. Miscellaneous program boards and appurtenances.</small> <small>One (1) - Moore Model 283AN Decimator. One (1) - Witten horizontal card file.</small> Reply to York Div., Borg-Warner, 56-61 55th Ave., Maspeth, N.Y. 11378, or call 212-894-7447, P. F. Whittemore.	WANTED IBM 370/138 To Buy or Lease Write Or Call: MILES KIMBALL CO. 41 West Eighth Ave. Oshkosh, WI 54901 Attention: Harold Gottgetreu, Mgr. EDP (414) 231-3800 Ext. 276	FOR LEASE QANTEL 1400-2 SYSTEM 64K - 1 Year Old 3401 Disk Drive 75 Meg. Two - 4011 Video Terminals 5061 Printer 300LPM 5213 Mag Tape Drive Cap. Cost \$75,000 Under Qantel Maintenance Software Available Richard Delaney Williams & Company (415) 692-8406	MSI DS/IV Order Entry Receiver. Available Immediately. Phone: (817) 778-5585 ext. 295 or 215	FOR SALE System 3 — Model 150 System 3 — Model 10 System 32 System 34 URS Call: Bob Luck (617) 438-4300 56 Montvale Ave. Stoneham, MA 02180 Since 1969
SYCOR Intelligent Terminal Model 351-1 with dual disk drive, synchronous communications adapter 3566, 60 CPS sprinter model 3606 and tractor feed module with printer stand. Model 3620. Two years old and under continuous factory maintenance contract. Unused since Aug. 79. Excellent condition. CALL 919-945-3731	DEC Datasystem DS 310 Mini Computer with LA180 Printer. 32 K byte memory. Includes 1 CRT, dual floppy disc drives and Datasystem cabinet. Financing Available. Write ONLC P.O. Box 3247, Spokane, WA 99220 or call (509) 456-6709	DEC 310's 32KB core, two dual floppy drives, VT52, LA180 printer. 2 identical systems immediately available. One new, \$12,000; one used, \$8,000. (206) 682-8482.	For Sale Immediate Available \$1,500 each or best offer Two 96-column Data Recorders Manufactured by Decision Data Corp. CITY OF WATSONVILLE Post Office Box 430 Watsonville, Calif. 95076 (408) 722-3551	4341-L Available Oct & Dec 1980 Contact: Bill Rummel CENTRON — DPL (612)-884-3366

buy sell swap	buy sell swap	buy sell swap	time & services	time & services																							
<p>370/125-2 384k AVAILABLE MAY 1980</p> <table border="0"> <tr><td>1</td><td>3203</td><td>2 (1200 LPM)</td></tr> <tr><td>1</td><td>3340</td><td>A2</td></tr> <tr><td>2</td><td>3340</td><td>B2</td></tr> <tr><td>1</td><td>3410</td><td>3 (80KB)</td></tr> <tr><td>1</td><td>3411</td><td>3 (80KB)</td></tr> <tr><td>1</td><td>3540</td><td>B1</td></tr> </table> <p>For details call or write: ADOBE OIL & GAS CORPORATION DATA PROCESSING DEPARTMENT 1100 Western United Life Bldg. Midland, Texas 79701 1-915-683-4701</p>	1	3203	2 (1200 LPM)	1	3340	A2	2	3340	B2	1	3410	3 (80KB)	1	3411	3 (80KB)	1	3540	B1	<p>DEC PDP8 • PDP11 HARDWARE</p> <table border="0"> <tr><td>Processors</td><td>Peripherals</td></tr> <tr><td>Disk</td><td>Tapes</td></tr> <tr><td>Memories</td><td>Terminals</td></tr> </table> <p>Reasonably Priced Quick Deliveries Fully Warrantied Call</p> <p>BROOKVALE ASSOCIATES 916 587-7777 • 800 425-1161</p>	Processors	Peripherals	Disk	Tapes	Memories	Terminals	<p>S/370 TIME AVAILABLE</p> <p>DELAWARE VALLEY AREA</p> <p>370/158 WITH A/P MVS-JES2</p> <p>Large Disk and Tape Capacity 1403-3800 Services Available PANVALET, ROSCOE, CA-SORT, IMS</p> <p>Sophisticated TP Network USA and Europe All Shifts Available 7 Days/Week Competitive Pricing 215-572-3500</p>	<p>BROKERS OF COMPUTER TIME</p> <p>N.Y., N.J. & CONN Only Computer Reserves, Inc. (212) 591-0770 (201) 676-1881</p>
1	3203	2 (1200 LPM)																									
1	3340	A2																									
2	3340	B2																									
1	3410	3 (80KB)																									
1	3411	3 (80KB)																									
1	3540	B1																									
Processors	Peripherals																										
Disk	Tapes																										
Memories	Terminals																										
<p>CMI AMERICA'S LEADING SPECIALIST SERVING THE USED MARKET!</p> <p>370/168 Attached Processor Available Immediately Sale or Lease</p> <p>Call 1-800-521-9648 CMI CORPORATION (313) 362-1000</p>	<p>BURROUGHS CPU'S</p> <p>84700 — Complete Systems 81728 — Complete Systems 840 and 8400 Minicomputer</p> <p>PERIPHERALS</p> <p>Disk Pack Drive & Controllers Magnetic Tape Units Memory Modules — I/C & Core 850 Peripherals</p> <p>TERMINALS</p> <p>Available for delivery hard to find 19881's</p> <p>IBM</p> <p>Series 1 — All Models & Peripherals</p> <p>(303) 922-8331 2480 West Alameda Ave. Denver, Colorado 80223</p>	<p>AVAILABLE IBM 4331 COMPUTER TIME</p> <p>Firm Located in Orange County, CA has extra 4331 computer capacity available on either 2nd or 3rd shift Mon. — Fri. For additional details call 714/535-8141 & ask for DP Services Coordinator.</p>	<p>***SYSTEM/34 USERS***</p> <p>Send for our free program product announcement and benchmark test demonstrating how to decrease RPG II program execution time. Simply send your company name and address to: AL- LCO SYSTEMS, 615 Burnett Ave., Suite 3; P.O. Box 274; San Francisco, CA 94101 (415) 285-4626</p>																								
<p>Short or Long Term Leases From RANDOLPH 4300's 303X</p> <p>... and all 370 CPU's and peripherals</p> <p>800-243-5307</p> <p>Randolph Computer Company Division of The Bank of Boston 537 Steamboat Rd., Greenwich, Ct 06830 (203) 661-4200</p>	<p>BROKER IN DEC COMPUTER SYSTEMS AND COMPONENTS</p> <p>C.D. SMITH 730 N. Post Oak Road #301 Houston, Texas 77024 (713) 686-9405</p> <p>BUY SELL</p> <p>DEC & HEWLETT-PACKARD</p> <p>SYSTEMS OPTIONS PERIPHERALS TERMINALS</p> <p>Western Data Systems 213/375-0523 PO Box 7000-182 Redondo Beach, CA 90277</p>	<p>ATTENTION COMPUTER USERS!</p> <p>FAMILIAR PROBLEMS</p> <table border="0"> <tr><td>PROCESSOR OVERFLOW</td><td>ANALYST NEEDS</td><td>UPGRADE YESTERDAY</td><td>POOR SERVICES</td></tr> </table> <p>PROBLEMS SHOULD BE DISCUSSED</p> <p>WE LISTEN</p> <p>370/158 • 370/168 • 370/180 • 3032 • AS6 BATCH • RJE • TIMESHARING TSO • CMS PROPRIETARY PACKAGES</p> <p>CHEER OUT OUR QUALITY SERVICES AT SENSIBLE RATES</p> <p>CALL: (201) 484-0750 Allied Computer Services, Inc. 3000 PARK AVENUE • EDISON NEW JERSEY 08817</p>	PROCESSOR OVERFLOW	ANALYST NEEDS	UPGRADE YESTERDAY	POOR SERVICES	<p>DEC USERS WE HAVE SOFTWARE IN PASCAL</p> <p>A/R, ORDER ENTRY, PAYROLL, A/P, G/L, ISAM FILE HANDLER, WORD PROCESSING SYSTEM</p> <p>COMPETITIVE PRICES — EASY TO USE FOR COMPLETE INFORMATION CONTACT THETA BUSINESS SYSTEMS 1110 Sonora Ave., Ste. 106 Glendale, CA 91201 (213) 242-7981 / 245-0917</p>																				
PROCESSOR OVERFLOW	ANALYST NEEDS	UPGRADE YESTERDAY	POOR SERVICES																								
<p>DATA GENERAL RDOS SYSTEMS Immediate Delivery</p> <p>Eclipse Development Systems \$19,350.00 8/200 with 48Kw Core; 2.5 Mbyte Disk; Floating Point; Mag Tape; CRT; Cabinet; Software; 30 Day Warranty</p> <p>Nova Development Systems \$12,600.00 Nova 1200 with 32Kw Core; 2.5 Mbyte Disk; Mag Tape; Tty; Cabinet; Software; 30 Day Warranty</p> <p>Options:</p> <ul style="list-style-type: none"> A. 4060 and (2) Beehive CRT's \$2,150.00 B. Add-on 2.5 Mbyte Disk \$1,850.00 C. Versatec 1100 Printer/Plotter (with Controller) \$2,500.00 <p>Many Other DG & DEC Systems and Peripherals Available</p> <p>CALL TODAY (408) 733-4400</p> <p>minicomputer exchange inc.</p>	<p>TIME & SERVICES</p> <p>I.B.M. 360-40</p> <p>All Shifts, 128K, 4-2401 MOD-2, 9-2314, 1403-N1, 2540, 1401 Compatibility.</p> <p>From \$35/Hour</p> <p>Restaurant Associates, Inc. 1540 Broadway New York, N.Y. 10036</p> <p>Contact: Al Palmo (212) 997-1413 Charles Leigey (212) 997-1411</p> <p>370/168 mod 3 Datacenter</p> <p>Specializing in Remote Job Entry TSO, CICS, and Batch IBM 3600 Laser Printer Very Attractive Rates Contact: Stu Karievsky (212) 564-3030</p> <p>Datamor 132 West 31 St. New York, N.Y. 10001</p>	<p>VAX TIME NON-PRIME TIME CONNECT \$2.50/HR</p> <p>SIGNAL TECHNOLOGY, INC. 15 W. De La Guerra St. Santa Barbara, CA 93101 (805) 963-1552</p> <p>VAX 11/780 COMPUTER TIME Washington, D.C. Area</p> <p>SOFTWARE</p> <ul style="list-style-type: none"> • FORTRAN • COBOL • BASIC PLUS • DATARIVE • PASCAL • C LANGUAGE <p>FUNCTIONAL ABILITIES</p> <ul style="list-style-type: none"> • PROJECT MANAGEMENT • FINANCIAL MANAGEMENT • CONVERSION EFFORTS • WORD PROCESSING • CONSULTING <p>PRIME SHIFT: 7:00AM - 7:00PM \$10 HR. CONNECT TIME PLUS CPU CHARGES OFF SHIFT: 7:00PM - 7:00AM \$5 HR. CONNECT TIME ONLY</p> <p>ON-LINE STORAGE AVAILABLE STAND ALONE TIME AVAILABLE</p> <p>CONTACT: MS D. LLOYD</p> <p>MANTECH DATA SYSTEMS, INC. 2320 Mill Road Alexandria, VA 22314 (703) 960-4729</p>	<p>Satisfied users.</p> <p>That's what Argonaut is all about. Because we have quality, time proven packages compatible with any ANSI COBOL compiler.</p> <p>PAYROLL/PERSONNEL ACCOUNTS PAYABLE GENERAL LEDGER TAXBREAK/TAXCOST (Payroll Tax Calculation Modules)</p> <p>Call us: (415) 444-5954</p> <p>ARGONAUT</p> <p>Argonaut Information Systems, Inc. 383 Grand Ave., Suite 6 Oakland, CA 94610 Member Software Industry Assoc. </p> <p>Possibility of Wide Market for your Software for S/34 AND SERIES/1</p> <p>We are interested to get in touch with owners of well tested commercial packages for S/34 and Series/1.</p> <p>Our needs are:</p> <ul style="list-style-type: none"> * On Line Entry/Edit and Inquiry * Flexibility * Ample Design * Strength in Backup and Recovery * Easy Implementation and Operation <p>We can buy, rent, or pay royalties. Please mail detailed specifications to: Apartado 21008, Caracas 102, Venezuela.</p>																								

C COMPILER FROM YOURDON

Source code in C and MACRO-11
so you can fit the compiler to your needs

Narrative program logic manual
so you know exactly how it works

Documented C test stream
so you can check out your modifications

C and RSX[®] runtime libraries
so you can load and go in RSX

License: \$2,500 Support: \$500/year

SCOTT GUTHERY, (212) 730-5840

YOURDON SOFTWARE
PRODUCTS GROUP

1133 Avenue of the Americas, New York, N.Y. 10036

RSX[®] is a registered trademark of Digital Equipment Corp.



**new generation
software**
FOR DEC/RSTS SYSTEMS

DBMS AMBASE—A complete Data Base Management solution including: Data/File Management, Inquiry Language Report Generator, Screen Formatting for enhancing system development. This PROGRAM DEVELOPMENT SYSTEM can increase the productivity of your programming staff by as much as 80%.

business control • Order Processing • Accounts Receivable
accounting • Accounts Receivable • Payroll
• Accounts Payable • GL/Financial Management

amcor computer corp.

1900 PLANTSIDE DRIVE • LOUISVILLE, KY. 40299 • 502/491-9820

FINANCIAL MODELING DEC PDP-11 RSTS/E

- Budgets
- Cash Flow
- Planning
- Consolidation
- Forecasts
- Project Evaluation

FINAR SYSTEMS

(212) 222 2784 132 Nassau St., #212
New York, NY 10038
(415) 348 6810 San Francisco
(312) 698 2023 Chicago
(713) 626 9577 Houston



FINAR
The Financial Analysis
and Reporting Language

DATAPPOINT USERS

Turnkey Accounting packages, in DATABUS[®], available for the 1500, 1800, 5500 and 6600 models, including ARC

- General Ledger with Supporting Schedules
- Accounts Receivable with Sales Analysis (Bal. FWD. & OPN. ITM.)
- Accounts Payable with Purchase Analysis
- Payroll Processing with Personnel Statistics
- Order Entry and Billing with Inventory Control

Each package is compatible on any Datapoint system. No need to modify or re-compile if hardware is upgraded.

- OEM and Software Representative pricing available
- Multiple package discounting
- Includes source code and full documentation
- Written warranty on all software
- Local demonstrations available
- No charge enhancements on all packages

Request write-ups and example reports from:

Mini-computer Support Group, Inc.

DATAPPOINT CORPORATION

Shaker Building — Suite 201
3645 Warrensville Ctr. Rd.
Shaker Heights, Ohio 44122

or call today at:

(216) 283-2000

DATABUS[®] and ARC[®] are registered trademarks of Datapoint Corporation
San Antonio, Texas

RSTS/E BASIC PLUS USERS

UNBAC — DECOMPLIER — Converts .BAC compiled programs into original source code. 100% conversion.

SECBAC — SECURE .BAC programs from being decompiled by any known decompiler, even our own.

SEC BAS — Secures .BAS source files from unauthorized access.

For information contact:

Custom Computer
Applications, Inc.
3878 Del St.
Memphis, TN 38118
Phone (901) 382-1325

AUSTRALIAN AGENCY FOR WORD PROCESSING SOFTWARE

A leading Australian Digital OEM seeks an Australian Agency for Word Processing Software which will run on Digital Data Systems 300 Series.

Write to
COMPUTERACC
P.O. Box 184
North Brisbane.
QLD 4000
Australia

BASIC FOUR

Announcing PLAN MASTR, a stand-alone Financial Modeling Package for the end user. All online & interactive. Excellent formatting/edit capabilities.

- forecasting
- budgeting
- cash flow
- sales analysis
- planning
- consolidation

WORTH AUGER & ASSOCIATES
1555 River Park Drive
Suite 206
Sacramento, CA 95815
(916) 929-0428

Contact: Gary Worth
Vendor inquiries welcome

PDP-11 USERS WORD PROCESSING NOW AVAILABLE IN PASCAL

Versions are available for use with RT-11, RSX[®], and RSTS/E[®] operating systems.

All are designed for easy addition to present EDN installations. Combine the power of WP on your present DP units. Complete hardware/software systems also available. For complete information, call or write:

Structural Programming Inc.
83 Boston Post Road
Sudbury, Massachusetts 01776
Telephone 617-443-5366
TWX 710-347-1054

*PDP, RT-11, RSX and RSTS/E are registered trademarks of Digital Equipment Corporation.

RPG TO COBOL

Dataware's software translator converts RPG and RPG II programs to the standard ANSI COBOL (DOS or OS). The translator achieves an extremely high percentage of automatic conversion (approaching 100%) of the source code.

- RPG/RPG II to PL/I
- PL/I to COBOL
- EASYCODER/TRAN to COBOL
- BAL/ALC to COBOL
- AUTOCODER (7070) to COBOL
- COBOL to COBOL
- AUTOCODER/SPS to COBOL

For more information on our translators, write or call today.

Dataware, Inc.
2565 Elmwood Avenue
Buffalo, NY 14217
(716) 876-8722

DEC RSTS/E APPLICATIONS

General Ledger
Accounts Payable
Accounts Receivable
Financial Planning
Reg Z Billing
Payroll

Going to DECUS? Contact us to set up a meeting with one of our sales representatives.

iMS COMPUTER SOLUTIONS TAILORED TO FIT YOUR DATA PROCESSING NEEDS
INTERACTIVE MANAGEMENT SYSTEMS, INC.
375 Concord Avenue, Belmont, Massachusetts 02178
(617) 489-3550

AUTHORIZED DIGITAL COMPUTER DISTRIBUTOR

Two distinguished products for PDP-11 users

INTACTM Interactive Data Base Management

INTAC is a new concept for data storage and retrieval that features an easy-to-use question and answer format, built-in edit rules, multi-key ISAM data access, interactive inquiry, and a unique report generator.

MAPSTM Financial Modeling

MAPS, recognized worldwide for over five years as a leader in financial modeling and reporting, is used to construct budgets, financial forecasts, consolidations and "what if" analyses.

Call us at
(415) 856-1100



1900 Embarcadero Road • Suite 208 • Palo Alto, California 94303

DEC USERS & OEMS

Comprehensive Warehouse Distribution System

- Completely On-Line/Interactive Processing
- Order Entry/Picking
- Tickets/Shipping Labels
- Back Order Processing
- Multi-Level Pricing/Price List
- Automatic Invoicing
- Inventory Control
- Purchase Order Control
- Automatic Receiving System
- WHSE Locator System
- Sales Analysis Reporting
- Full A/R Processing
- Full A/P Processing
- DIBOL - CT5300 (RT11) OR CT5500 (RSTS/E)

Full Software line includes MFG. & ACCT. Systems, DEC Hdwr. & Software Assistance as needed.

Call: Deb Herbert
J. BAKER & ASSOC., INC.
300 Marquardt Dr.
Wheeling, IL 60090
(312) 459-3900
TWX: 910-651-0010

RPG II SYSTEMS

- *A/R-OPEN ITEM OR B/F
- *ACCOUNTS PAYABLE
- *GENERAL LEDGER
- *PAYROLL AND LABOR DIST.
- *INVENTORY
- *CREDIT UNION MAILING, ETC

Extensive Documentation Provided
Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, LA 71291
(318) 388-2236

DIAL AN ADP INSTRUCTOR

Professional D.P. Instructions and workshop given in your classroom.
ANS Cobol, OS/DOS-JCL, OS/DOS CORE DUMPS, Introduction D.P. Also will contract for Hardware Study and Software Automation. Fifteen years exp. Ph. (703) 898-3270 or write C. Newson, Rt 3, Box 885, Fredericksburg, Va. 22401.

IBM 6670 WATCH OUT!

We've already attached you to DEC mainframes. Who knows where you're going next?

Let us ease this extraordinary later printer into your DP configuration. Custom installations available. Call us.

UNIQUE AUTOMATION PRODUCTS

17922 Sky Park Circle, Suite L
Irvine, Ca 92714
(714) 549-4832

WATER UTILITY BILLING

Needed for a client; interactive menu-driven software to run on a small business or commercial TS system. Must be well conceived and documented for easy use and maintenance. Contact: Scotty Winfield, STAFF Computer Tech. Corp., 10457 J Rosselle St., San Diego, CA 92121 (714) 453-0303.

MEDICAL/DENTAL BILLING & INSURANCE

Services to doctors, dentists, groups and clinics

ON-LINE or BATCH

- IBM, Datapoint, DEC & HP
- Complete billing and insurance
- Cobol, RPG, Basic
- Service Bureau or In-Clinic
- Over 50 installations

call or write to
**Occidental Computer
Systems, Inc.**
5665 Valjean Ave.
Van Nuys, CA 91406
(213) 782-3003

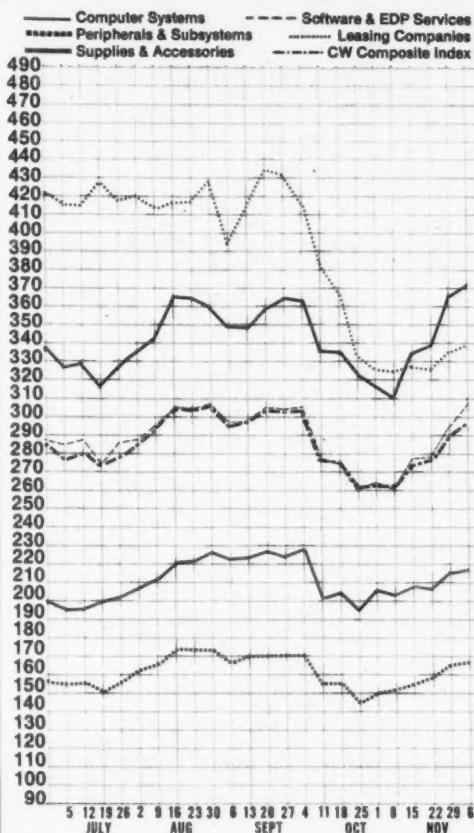
Software for Sale

System 3 — CCP Specialists

If you need systems design, programming, or a software package per se, we have it. Any or all give us a call —

(615) 688-8065
Business Sciences Inc.
P.O. Box 22006
Knoxville, TN 37922

Computerworld Stock Trading Index

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CW COMMUNICATIONS/INC.

Board Chairman/Publisher
Patrick J. McGovern
President
W. Walter Boyd

VP-Research Jack Edmonston
VP-Marketing Roy Einreinhofer
VP-Editorial E. Drake Lundell, Jr.
VP-Finance William P. Murphy
VP-Circulation Margaret Phelan
VP-Production Lee Vidmer

Computerworld Headquarters
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

SALES

Vice President Roy Einreinhofer
Administrator Frank Collins
Display Adv Melinda Walker
Miriam Gaylin
Classified Adv Mgr William J. Mills

RESEARCH

Vice President Jack Edmonston
Market Research Kathryn Dinneen

CIRCULATION

Vice-President Margaret Phelan
Circulation Mgr Barbara Jeannetti
Service Rep Peggy Kelly
Assistant Carmela Priante

PRODUCTION

Vice-President Lee Vidmer
Production Mgr Peter Holm
Supervisor Henry Fling
Typesetting Mgr Tom Pfau

Computerworld Sales Offices

Roy Einreinhofer
Vice-President/Marketing
Frank Collins
Manager, Display Advertising
William J. Mills
Manager, Classified Advertising
COMPUTERWORLD
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

BOSTON
Robert Ziegler
Northern Regional Manager
Chris Lee

Senior Account Manager
Edward P. Marecki, Jr.
Account Manager
Kathy Doyle
Account Coordinator
COMPUTERWORLD
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

NEW YORK
Donald E. Fagan
Eastern Regional Manager
Mike Eisenkraft
District Manager
Peter Senft
District Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

CHICAGO
Thomas H. Knorr, Jr.
Midwestern Manager
Jane Wrightman
Account Coordinator
COMPUTERWORLD
230 North Michigan Avenue
Chicago, Ill. 60601
(312) 782-7565

SAN FRANCISCO
William J. Healey
Western Regional Manager
Ruth Gordon
Account Coordinator
COMPUTERWORLD
353 Sacramento Street
Suite 600
San Francisco, Calif. 94111
Phone: (415) 421-7330

LOS ANGELES
Jim Richardson
District Manager
Bob Hubbard
Account Manager
Kathy Knox
Account Coordinator
COMPUTERWORLD
3420 Ocean Park Boulevard
Suite 3020
Santa Monica, Calif. 90405
Phone: (213) 450-7181

JAPAN
Mr. Shigemasa Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: J2424461

UNITED KINGDOM
Steve Burton
IDG PUBLISHING LTD.
140-146 Camden Street
London NW1 9PF
Phone: (01) 267-1201
Telex: UK-264737

WEST GERMANY
CW PUBLIKATIONEN
Friedrichstrasse 31
8000 Munich 40
Phone: (089) 940-961
Telex: W.Ger-5-215250-HKFD

AUSTRALIA
Alan Power
COMPUTERWORLD PTY. LTD.
3 Bruce Street
Crows Nest, NSW 2065
Phone: 929-5368
Telex: SECCO AA25468

BRAZIL
Eric Hippie
COMPUTERWORLD do BRAZIL
Servicos e Publicacoes Ltda.
Rua Alcindo Guanabara
25/10th floor
20031 Rio de Janeiro, RJ
Phone: (021) 242-7395
Telex: 11-32017 (WORD BR)

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 5, 1979

All statistics compiled,
computed and formatted
by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

EXCH	PRICE				EXCH	PRICE				EXCH	PRICE										
	1978-79 RANGE (1)	CLOSE DEC 5 1979	WEEK NET CHANGE	WEEK PCT CHNGE		1978-79 RANGE (1)	CLOSE DEC 4 1979	WEEK NET CHANGE	WEEK PCT CHNGE		1978-79 RANGE (1)	CLOSE DEC 5 1979	WEEK NET CHANGE	WEEK PCT CHNGE							
COMPUTER SYSTEMS																					
A AMDAHL CORP	17- 69	23 1/2	- 3/8	-1.5	D ADVANCED COMP TECH	1- 2	3 1/4	- 1/8	-14.2	A DATA ACCESS SYSTEMS	0- 10	8 3/4	+1	+12.9							
N BURROUGHS CORP	57- 87	80 3/4	+1	+1.2	D ANACOMP INC	6- 24	17 1/2	+ 3/4	+4.4	D DATA PRODUCTS CORP	13- 25	17 1/4	+1	+0.7							
D COMPUTER AUTOMATION	9- 44	11 3/4	+1	+3.4	A APPLIED DATA RES.	8- 17	9 5/8	0	0.0	D DATUM INC	2- 6	2 7/8	0	+11.7							
V CONTROL DATA CORP	23- 55	55 1/8	+1 5/8	+3.0	N AUTOMATIC DATA PROC	24- 40	36 1/4	-2 1/4	-5.8	D DECISION DATA COMPUT	6- 34	21 3/4	+2 3/8	+12.2							
D DECISIONS INC	6- 47	45 1/4	+1	+2.6	D COMM-SERV NETWORK	3- 17	17 1/4	+ 1/4	+0.6	D DELTA DATA SYSTEMS	6- 32	27 1/4	+2 3/8	+15.9							
N DATA GENERAL CORP	42- 76	75 1/4	+2	+1.4	D COMPUTER HUMIZONS	1- 9	9 1/4	+1 1/2	+40.0	D DOCUMENTATION INC	3- 9	3 1/2	+1/8	+12.0							
N DATAPORT CORP	34-104	104	+8	+9.1	D COMPUTER NETWORK	5- 16	5 7/8	+ 1/2	+9.3	D ELECTRONIC M & M	1- 2	3/4	+1/8	+9.0							
N DIGITAL EQUIPMENT	19- 69	67 3/8	+ 1/4	+0.3	N COMPUTER SCIENCES	8- 18	18 3/8	+ 1/2	+8.8	D FABRI-TEK	1- 2	3/4	+1/8	+9.0							
N ELECTRONIC ASSOC.	2- 13	7	+ 1/8	+1.8	D COMPUTER TASK GROUP	1- 7	6 3/4	+ 1/4	+3.8	D GENERAL COMPUTER SYS	1- 3	1 7/8	+1/8	+7.1							
A ELECTRONIC ENGINEER.	9- 19	15 1/4	+ 1/2	+3.1	D COMPUTER USAGE	4- 6	4 2	+ 1/4	+14.2	D GENERAL DATACOM IND	9- 21	18	0	0.0							
N FOUR-PHASE SYSTEMS	19- 46	46 3/8	+ 7/8	+1.9	D COMPUTER AUTO REC SVC	6- 10	4 3/4	+ 1/4	+5.0	N HAZELTINE CORP	10- 21	20 7/8	+ 5/8	+3.0							
N FOXBORO	28- 44	39	+ 1/4	+0.6	D COMSHARE	6- 26	17 1/2	+ 1/4	+1.4	N HARRIS CORP	17- 36	31 1/2	-1 1/8	-3.4							
N GENERAL AUTOMATION	7- 26	12 3/8	+ 1/2	+1.6	D CLOUDLINE CORP	14- 33	31 1/4	+ 3/4	+17.9	N INFORTEK INC	1- 11	1 1/2	0	0.0							
D GURU COMPUTER CORP	1- 1	1/2	+ 1/8	+2.0	D DATA DIMENSIONS INC	1- 4	1 3/4	+ 1/4	+10.0	N INFORMATION INTL INC	7- 12	8 1/2	+1/4	+2.8							
N HONEYWELL INC	24- 63	57 1/4	+ 1/4	+0.4	D DATARAP	1- 4	1 1/4	+ 1/4	+10.0	N INFORUM CORP	1- 2	3/8	+1/8	+5.0							
N IBM	43- 83	80 1/2	+ 1/2	+1.7	N ELECTRONIC DATA SYS.	15- 28	26	+ 1/8	+0.6	D INTERSIP	7- 32	29	+ 1/4	+0.8							
D MANAGEMENT ASSIST	9- 29	17 7/8	+ 1/4	+1.3	D IPS COMPUTER MARKET	2- 3	3	+ 1/4	+20.0	A LUNDY ELECTRONICS	6- 8	7	+1/4	+3.7							
D MANUFACTURING DATA S	9- 35	34 1/2	+ 2	+6.0	N KEANE ASSOCIATES	3- 6	5 1/4	0	0.0	D MSI DATA COMP	6- 19	7 5/8	-1 1/4	-3.1							
D MINI-COMPUTER SYST	2- 8	3	+ 3/8	+11.1	D KEYWORD CORP	1- 4	3 1/2	0	0.0	N MEMOREX	18- 59	19 5/8	-1 1/2	-7.1							
D MODULAR COMPUTER SYST	T- 18	10 7/8	+ 1/2	+4.3	A LOGICON	18- 19	16 1/4	+ 3/4	+4.8	N MOWAH DATA SCI	6- 16	15 5/8	+ 3/8	+2.4							
N NCR	37- 81	85 3/4	+ 1/2	+0.0	N NATIONAL DATA CORP	7- 17	15 3/4	-1	0.0	N OMER	2- 8	8 1/2	0	0.0							
N PRIME COMPUTER INC	9- 23	23 1/8	+ 1/4	+2.5	N PLANNING RESEARCH	6- 17	15	+ 1/2	+2.0	N PARADYNE CORP	4- 23	23	+1/8	+5.5							
N PERKIN-ELMER INC	17- 39	39 3/8	+ 3	+9.3	N PROGRAMMING & SYS	1- 1	7/8	+ 1/8	+16.6	N PENFIL CORP	5- 13	13 1/4	+1 3/8	+11.5							
N SPCY RND	33- 52	49 1/8	+ 1/4	+0.5	D RAPIDATA INC	3- 7	4 3/8	+ 1/8	+2.7	N PERTFC CORP	8- 17	16 3/8	0	0.0							
A SYSTEMS ENG. LABS	11- 24	18 1/8	+ 1/2	+9.8	N REYNOLDS REYNOLD	18- 36	29	+ 1/8	+9.8	N POTTER INSTRUMENT	2- 2	1 3/4	0	0.0							
D TANDEM COMPUTERS INC	13- 40	39 1/2	+ 2	+6.0	N SCIENTIFIC COMPUTERS	3- 9	9	+ 1/2	+5.8	N RECOGNITION EQUIP	5- 13	6 5/8	+ 3/8	+5.3							
A WANG LABS.	6- 32	32	+ 2 1/4	+7.5	N TINSMARSH INC	18- 50	50 1/8	+ 2	+4.1	N SCAN DATA	1- 5	1 5/8	+ 1/8	+0.8							
LEASING COMPANIES																					
D BOOTHES FINANCIAL CP	13- 21	17	0	0.0	N URS SYSTEMS	5- 8	7 7/8	+ 3/4	+10.5	D STORAGE TECHNOLOGY	14- 46	16 7/8	-1 1/4	-1.4							
D COMDISCO INC	3- 21	11 1/2	+ 1 1/2	+15.0	N WYLY CORP	1- 7	5 1/2	0	0.0	D T RAP INC	11- 25	24	0	0.0							
A COMMERCE GROUP CORP	1- 1	1/4	0	0.0	PERIPHERALS & SUBSYSTEMS																
D COMPUTER INSTRVS GRP	1- 7	2 1/8	+ 1/8	+10.5	N AM INTERNATIONAL	13- 32	13 3/4	+ 1/2	-3.5	D TEC INC	6- 13	5 3/4	+ 1/8	+2.1							
D CONTINENTAL INFO SYS	3- 15	2 7/8	+ 1/8	+0.5	N ANDERSON JACOBSON	10- 29	10 1/2	+ 1/2	+2.6	D TELETRONIX INC	33- 63	59 1/2	+ 1/8	+3.5							
D DATACOM RENTAL	1- 4	2 1/2	0	0.0	N BEEHIVE INT'L	6- 22	9	+ 1/8	+1.4	D TESDATA SYSTEMS INC	8- 26	18 1/4	+ 2 3/4	+36.6							
A DCL INC	3- 6	5 1/8	0	0.0	N BUNKER-RAMU	10- 29	26 5/8	+ 1/8	+4.4	D WILTEK INC	1- 2	1/4	-1/8	-13.3							
N DPL INC	8- 14	9 5/8	+ 5/8	+7.0	N CAMBRIDGE MEMORIES	1- 9	1 3/8	+ 1/8	-15.3	SUPPLIES & ACCESSORIES											
N DTFL INC	4- 30	5 1/8	+ 5/8	+10.0	N CENTRONICS DATA COMP	10- 54	51	+ 1/4	+3.5	A AMERICAN BUS PRIMS	6- 12	10 3/4	-1 1/4	-2.2							
N LEASPC CORP	24- 55	54	+ 1 3/4	+3.3	N COGNITRONICS	6- 13	2 1/4	+ 1/4	+12.5	D BATTISON BUS FORMS	1- 34	21 3/8	- 3/8	-1.7							
A PIONEER TEA CORP	2- 7	1 1/8	0	0.0	N COLOGRAPH	6- 13	1 1/4	+ 1/4	+12.5	N BARRY WRIGHT	1- 34	21 3/8	- 3/8	-1.7							
N U.S. LEASING	12- 20	15 1/8	+ 7/8	+6.1	N COMPUTER COVSLES	4- 18	18	+ 1/8	+5.8	N CYBERNETICS INC	1- 1	3/4	0	0.0							
EXCH: N=NEW YORK & AMERICAN P=PHIL-BALT-DASH L=NATIONAL M=MIAMI S=SHANGHAI T=TAIWAN-COUNTER 0-T-C PRICES ARE 9/10 PRICES AS OF 3 P.M. OR LAST RID (1) TO NEAREST DOLLAR																					
PERIPHERALS & SUBSYSTEMS																					
N CONRAD CORP	13- 26	16 1/8	- 3/8	-2.2	N DUXLEY INSTRUMENT	4- 18	18	+ 1/8	+5.8	N DUPLEX PRODUCTS INC	13- 31	26 1/4	- 1/2	-1.8							
SUPPLIES & ACCESSORIES																					
N NASHUA CORP	10- 37	31	+ 1/8	+1.2	N ENNIS RUS. FORMS	5- 21	15 7/8	- 1/2	-0.7	N 3M COMPANY	43- 66	50 1/4	0	0.0							
N STANDARD REGISTER	20- 29	25	+ 1/8	+1.2	N MOORE CORP LTD	20- 36	30	+ 1/4	+4.3	N NASHAV CORP	10- 37	31	+ 3/8	+1.2							
N TAC PRODUCTS CO	8- 19	14 1/8	+ 1/8	+0.8	N NASHUA CORP	10- 37	31	+ 1/8	+1.2	N NASHAV CORP	10- 37	31	+ 1/8	+0.8							
N WALLACE BUS FORMS	10- 33	27 5/8	+ 1/2	+1.8	N NASHAV CORP	10- 37	31	+ 1/8	+1.2	N NASHAV CORP	10- 37	31	+ 1/8	+0.8							

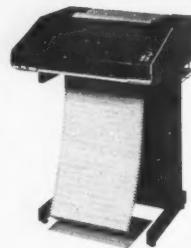
YOUR PRINTER SYSTEM CONNECTION. IT'S SOUTHERN SYSTEMS.

Interfaced and configured printer systems — with speeds ranging from 200 to 1,500 lines per minute — to function with most computers on the market today. That's the versatile connection you need for satisfying your printer criteria. And it's yours with Southern Systems.

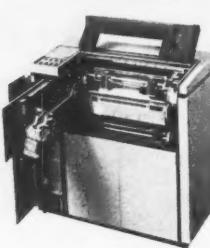
For your DEC, DG, Hewlett-Packard, Perkin-Elmer, Burroughs, TI and other processors, Southern Systems gives you the most reliable hard-copy output system on the market today. You'll realize savings up to 50 percent. With printer systems based on Drum, Band, Matrix and Train technology. Plus your choice of parallel or serial interfacing for practically all processors.

Because your printer needs are very special, you need the complete, reliable connection you'll find at Southern Systems.

You're the printer connection I've been looking for. Please send information on:



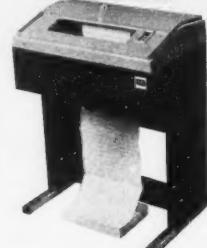
M-200
(200 lpm impact
matrix)



2550
(1500 lpm
Charaband)



CT 1200 series
(600, 1000, 1200
lpm ChainTrain)



2200 series
(300, 600, 900
lpm drum)



B Series
(300, 600 lpm
band)

SI 22 serial interfacing (for remote functioning of high speed line printers)

PS 10 (special switching equipment allowing one printer to service several computers)

My computer type is _____

My requirements: Immediate 3-6 months For information only

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

SSI

**SOUTHERN
SYSTEMS, INC.**

Intracoastal Building
3000 Northeast 30th Place
Fort Lauderdale, FL 33306
(305) 561-5226
(800) 327-6929
Telex 522135

